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ERRATA.

Page	30	line 11	for "*inerta*"	read	"*incerta*"
,,	44	,, 22 ,,	"*primus*"	,,	"*prinus*"
,,	58	,, 8 ,,	"*Dicera*"	,,	"*Dicerca*"
,,	68	,, 33 & last line	for "*ambrizzia*"	read	"*ambrizia*"
,,	69	,, 15			
,,	114	,, 7	for "*semiputella*"	read	"*semipullata*"
,,	115	,, 37 ,,	"*scutellator*"	,,	"*scutellatus*"
,,	118	,, 37 ,,	"*clausseni*"	,,	"*clauseni*"
,,	126	,, 22 ,,	"*Hypsilophus*"	,,	"*Hypsolophus*"
,,	136	5 lines from end	for "*Sericata*"	,,	"*Serica*"
,,	139	line 27	for "ix"	,,	"lx"
,,	141	,, 2 ,,	"*Carthamnus*"	,,	"*Carthamus*"
,,	145	,, 24 ,,	"1924, no. 19"	,,	"1923, no. 19"
,,	145	,, 32 ,,	"1924, no. 20"	,,	"1923, no. 20"
,,	150	,, 4 ,,	"*Cocoloba*"	,,	"*Coccoloba*"
,,	154	,, 18 ,,	"*Leucostuma*"	,,	"*Leucostoma*"
,,	154	,, 38 ,,	"*sessiflora*"	,,	"*sessiliflora*"
,,	155	,, 34 ,,	"*Echimopsis*"	,,	"*Echinopsis*"
,,	159	6 & 9 lines from end	for "*Corythucha*"	read	"*Corythuca*"
,,	192	13 ,, ,, ,, ,,	"*Eupterix*"	,,	"*Eupteryx*"
,,	193	15 ,, ,, ,, ,,	"(A. W. L.)"	,,	"(L[ong], A. W.)"
,,	194	9			
,,	195	line 17	for "194"	read	"184"
,,	218	,, 5 ,,	"*cassidae*"	,,	"*cassidea*"
,,	228	,, 30 ,,	"xi, 307"	,,	"xi, 304"
,,	250	,, 4 ,,	"*Niptus hololeucus*"	,,	"a beetle of the genus *Mezium*"
,,	250	,, 7 ,,	"this Ptinid"	,,	"*Niptus hololeucus*"
,,	260	,, 15 ,,	"*callida*"	,,	"*calida*"
,,	272	,, 25 ,,	"*octasema*"	,,	"*octosema*"
,,	275	,, 24 ,,	"*tesselaris*"	,,	"*tessellaris*"
,,	277	,, 26 ,,	"Parrott (P. G.)."	,,	"Parrott (P. J.)."
,,	280	,, 9 ,,	"Pettit (H. R.)"	,,	"Pettit (R. H.)"
,,	289	,, 25 ,,	"*Chilochorus*"	,,	"*Chilocorus*"
,,	297	,, 20 ,,	"*Coeliodes*"	,,	"*Coeloides*"
,,	300	,, 21 ,,	"*Euryphlepsis*"	,,	"*Euryphlepsia*"
,,	303	,, 17 ,,	"*Psylloides*"	,,	"*Psylliodes*"
,,	322	,, 28 ,,	"*Maurita*"	,,	"*Mauritia*"
,,	346	,, 6 ,,	"*Dibrachiodes*"	,,	"*Dibrachoides*"
,,	351	,, 35 ,,	"*Maybenus*"	,,	"*Maytenus*"
,,	389	,, 30 ,,	"*scolymnus*"	,,	"*scolymus*"
,,	406	9 lines from end	for "*Librocedrus*"	read	"*Libocedrus*"
,,	416	line 37	for "*lapsiligni*"	read	"*lapisligni*"
,,	420	,, 22 ,,	"*Mellitia*"	,,	"*Melittia*"
,,	428	,, 34 ,,	"viii"	,,	"vii"
,,	470	,, 20 ,,	"*Diathrothrips*"	,,	"*Diarthrothrips*"
,,	518	,, 32 ,,	"*Notoloea*"	,,	"*Noteloea*"
,,	522	2 lines from end	for "*Arcilasia*"	,,	"*Arcilasisa*"

IMPERIAL BUREAU OF ENTOMOLOGY.

REVIEW
OF
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SERIES A.

VOL. XII.] [1924.

TURNER (W. F.). **Kernel Spot of Pecan caused by the Southern Green Soldier Bug.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 440–445, 1 pl. Geneva, N.Y., October 1923.

As a result of the feeding of *Nezara viridula*, L. (southern green soldier bug) on the kernels of pecan nuts, the tissue of the kernel breaks down, showing a hemispherical discoloured portion, and causing the whole kernel to taste bitter. Only the kernel is affected, and the defect is not noticeable until the nut is cracked. Kernel spot is caused only by the adult bugs during the time the kernel is hardening. They feed freely on the nuts, and continue their attack even after the husks have split, forcing their way between the loose husk and the shell and thrusting their rostra through the shells, which they can pierce even up to the time of harvesting. Breeding does not occur on the nuts, but takes place on many leguminous plants, okra [*Hibiscus esculentus*] and cotton. Almost every garden and field crop is attacked; cowpeas and soybeans in particular should be avoided as cover crops in the orchards.

Experiments indicate that other bugs may do similar damage, this being experimentally proved in the case of adults of *Euschistus* sp. and of *Leptoglossus phyllopus*, F. These, however, are not sufficiently numerous to cause any economic injury.

MIDDLETON (W.). U.S. Bur. Ent. **A Note on the Honey Dew Production of the Aphid, *Longistigma caryae*, Harris.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 446–448. Geneva, N.Y., October 1923.

During the autumn of 1922, the Aphid, *Longistigma caryae*, Harr., was found to be still active and excreting honey-dew on sycamores in various towns, where it was so numerous that it was an annoyance to passers-by. The summer had been warm and dry, and weather records showed that the temperature during October and November (when the Aphids were still abundant) was above the average, not only producing favourable conditions for the Aphids but probably also providing a stimulus to the trees and an increase of sap.

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CUTRIGHT (C. R.). **Life History of** *Micromus posticus*, **Walker.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 448–456. Geneva, N.Y., October 1923.

The Hemerobiid, *Micromus posticus*, Wlk., deposits its eggs in irregular groups on the lower surface of the leaves of plants, generally those that are infested with Aphids. One female lays an average of 144 eggs. After an incubation period of 4 days, the larvae appear and search for the Aphids, from which they suck the body juices. They have also been observed to feed on the eggs of Coccinellids and of the cabbage butterfly [*Pieris*], and of their own species. The larval period averages 8 days, after which a cocoon is spun and pupation occurs, probably under clods or stones or possibly in the soil. Pupation lasts a little over 4 days. The adults are active at dusk and on cloudy days, resting at other times on the lower surface of the leaves. The average length of life is 21 days, and there are several generations in a year. In spite of their predacious habits, these insects seem to be of little economic importance in controlling Aphids ; they are rather frail, and probably many are destroyed by storms.

STEAR (J. R.). **A Tingid attacking Quince.**—*Jl. Econ. Ent.*, xvi, no. 5, p. 458. Geneva, N.Y., October 1923.

The Tingid, *Corythuca cydoniae*, Fitch, was observed in June to be injuring quince trees, the feeding of the nymphs and adults causing mottling of the leaves.

STEAR (J. R.). *Ormenis pruinosa*, **Say—a Fulgorid on Apple and Peach.**—*Jl. Econ. Ent.*, xvi, no. 5, p. 458. Geneva, N.Y., October 1923.

The Fulgorid, *Ormenis pruinosa*, Say, has recently been numerous locally on apple and peach, the white woolly nymphs being frequently mistaken for woolly aphis [*Eriosoma lanigerum*, Hausm.]. No injury was observed as a result of their feeding.

WOLCOTT (G. N.). **An Important New Pest of Beets in Porto Rico.**—*Jl. Econ. Ent.*, xvi, no. 5, pp. 459–460. Geneva, N.Y., October 1923.

The Halticid, *Disonycha laevigata*, Jac., has recently become very abundant in Porto Rico, feeding on the leaves of cultivated beet. It has also been recorded as feeding on *Amarantus* spp., and has been found on the leaves of young sugar-cane and bean plants, which, however, it did not attack. Chard, egg-plant and many other vegetables are said to be attacked. The weed, *Philoxerus vermiculatus*, was defoliated and destroyed over a large area by this beetle.

FROST (S. W.). **The Oriental Peach Moth** (*Laspeyresia molesta*, **Busck**). —*Jl. Econ. Ent.*, xvi, no. 5, p. 461. Geneva, N.Y., October 1923.

Several outbreaks of *Cydia* (*Laspeyresia*) *molesta*, Busck (Oriental peach moth) have been discovered in Pennsylvania during the last few months. The later varieties of fruit were so badly attacked that in some cases the crop was unmarketable. The larvae of the fourth

generation were found to pupate chiefly at the stem end of the fruit. Some adults emerged as late as 7th September, and appeared to be starting a fifth generation.

WHITNEY (L. A.). **Mealybugs intercepted at Quarantine.**—*Hawaiian Forester & Agriculturist*, xx, no. 3, pp. 90–95, 3 plates. Honolulu, July–September 1923.

The distribution and food-plants of *Pseudococcus maritimus*, Ehrh., *P. gahani*, Green, *P. comstocki*, Kuw., *P. lilacinus*, Ckll., and *Trionymus* sp. are recorded. These mealybugs have been intercepted for the first time on imported plant material in Hawaii during 1921 and 1922.

EHRHORN (E. M.). **Reports of Chief Plant Inspector, April-June 1923.** —*Hawaiian Forester & Agriculturist*, xx, no. 3, pp. 116–122. Honolulu, July–September 1923.

The pests intercepted in April, May and June 1923 included: From Japan, *Parlatoria pergandei* on pomelos, *Leucophaea surinamensis*, *Pheidole* sp., *Prenolepis* sp., a Scarabeid beetle, Monophlebid larvae, and earwigs, on chrysanthemum plants, *Lepidosaphes ficus* on sandpears, and *Monomorium pharaonis*; from China, *Cremastogaster* sp. and *Pheidole* sp. in yams; from the Philippines, *Bruchus chinensis* in vegetable seeds and dry beans, *Lepidosaphes* sp. on betel nuts, *Pseudococcus citri* on ginger, *Calandra* (*Sitophilus*) *oryzae* in grain, and *Aspidiotus destructor* on coconuts; from New Zealand, *Pseudococcus comstocki* and woolly aphis [*Eriosoma lanigerum*] on apples; and from the Azores, *Bruchus obtectus* in dried beans.

Está descoberto o inimigo natural do "piolho de S. José." [The Natural Enemy of the San José Scale has been discovered.]—*Chacaras e Quintaes*, xxviii, no. 4, p. 304. S. Paulo, 15th October 1923.

A Tenebrionid beetle, *Epitragus mucidus*, Berg., has been observed to devour the San José scale, *Aspidiotus perniciosus*, Comst. This may perhaps account for the fact that *A. perniciosus* is not a dangerous pest in Brazil.

RIESLE P. (R.). **El Pulgón lanígero del Manzano, su tratamiento y estudios hechos en Chile para combatirlo** (*Eriosoma lanigera*). [The Woolly Apple Aphis, its Treatment, and Studies made in Chile for combating it.]—*Agronomia*, xiii, no. 2, pp. 62–67. Santiago, April–June 1923. [Received 6th November 1923.]

At the present time the action of natural enemies, such as *Aphelinus mali*, which has been recently imported, and Syrphid and Coccinellid larvae, is insufficient to check the infestation of fruit-trees by *Eriosoma lanigerum*, and recourse must be had to spraying. Two formulae are specially recommended. One, for use in spring, is prepared by dissolving 1½ gals. calcium polysulphide of 15° Bé. in 60 gals. water and

adding 10 gals. water in which 2½ lb. iron sulphate has been dissolved. This is emulsified with a mixture of 10 gals. petroleum and 20 gals. soap solution (prepared from ordinary laundry soap), and finally an emulsion of 10 gals. water and 2 gals. of an adhesive, manufactured locally, is incorporated. When thoroughly mixed the solution is ready for spraying. About 4 gals. are needed for a tree of 8–12 years. For an autumn spray 5 lb. each of flowers of sulphur and soda lye (as used in soap making) are mixed with 55 gals. cold water. The mixture is made lukewarm and 50 lb. of tobacco dust is added, and the whole is then boiled for 10 minutes and strained. To the solution thus obtained there is added another containing 1 gal. of the adhesive mentioned above diluted in 3 gals. water. The density of the final mixture must be 2° Bé., if it is more it is necessary to add water. Legislation is being prepared compelling horticulturists to treat their trees in autumn.

Bruner (S. C.). **Es muy daniña la mosca prieta? Notas entomologicas.** [Is *Aleurocanthus woglumi* very injurious? Entomological Notes.]—*Rev. Agric. Com. y Trabajo*, v, no. 4, pp. 6–8, 1 fig. Havana, June 1922. [Received 5th November 1923.]

In Cuba, as in Jamaica, *Aleurocanthus woglumi* is not a very dangerous pest, and entomogenous fungi, which in Cuba are *Aschersonia aleurodis*, *A. turbinata* and *Aegerita webberi*, help to keep it in check. Measures against it in Cuba have been noticed [*R.A.E.*, A, xi, 104, 229].

Bruner (S. C.) & Acuña (J.). **Sobre la biologia de** *Bephrata cubensis*, **Ashm., el insecto perforador de las frutas anonaceas.** [The Biology of *B. cubensis*, the Borer of Anonaceous Fruits.]—*Rev. Agric. Com. y Trabajo*, vi, no. 7, pp. 21–30, 14 figs. Havana, 1923.

This is a report of biological observations made in 1922 on the Chalcid, *Bephrata cubensis*, Ashm., which is distributed throughout Cuba [*R.A.E.*, A, xi, 511] and is also found in Florida. In Cuba it breeds in the seeds of *Anona reticulata*, *A. squamosa*, *A. muricata*, *A. palustris* and *A. cherimolia*, and probably in other fruits of this genus. In Florida, *A. glabra* is also attacked. The males are very rare and are described here for the first time. Reproduction is usually parthenogenetic and pairing probably occurs only at long intervals after several generations. The eggs are deposited in the most tender seeds. The fruits may be attacked as soon as they have attained a diameter of ½ in. and continue to be attacked until the seeds are at a depth exceeding 3 in. or until the seeds have hardened. From 1 to 54 eggs have been found in one seed, but only one individual survives the early larval stages. In captivity from 200 to 250 eggs may be laid. Incubation requires 12–14 days. The larval stage lasts 6–8 weeks in summer. Pupation takes from 12 to 18 days. The complete life-cycles observed required from 72 to 82 days in summer. Oviposition may begin within a day and a half of transformation into the adult and within one or two hours of the emergence of the adult from the fruit. In captivity the adults lived from 10 to 20 days. They will accept water and water mixed with an equal part of honey. *B. cubensis* is active throughout the year.

MAHDIHASSAN (S.). **Classification of Lac Insects from a Physiological Standpoint.**—*Jl. Sci. Assoc., Maharajah's Coll., Vizianagaram*, i, no. 2–3, pp. 47–99. Madras, July and October 1923.

There appear to be four species of lac insects in Mysore. The author considers that the species found on *Shorea talura* and *Ficus mysorensis* are true lac insects, for which he erects the genus *Lakshadia*,* while those found on *Pongamia glabra* and *Ixora parviflora* he calls pseudo-lac insects, and he proposes to restrict the old generic name of *Tachardia** to them. Of these species, the one found only on *S. talura* is solely responsible for the lac industry in Mysore. The author considers that the morphology affords a very inadequate basis for classifying these insects, and maintains that their physiology should also be taken into consideration, as the two aspects seem to him to be mutually dependent. He has therefore made a study of the micro-organisms associated with the lac insects, on the assumption that, as different food-plants may have their characteristic lac insects, these in turn might harbour a special micro-flora associated with each species living freely and in symbiosis. He suggests, also, that perhaps better than the physiological standpoint is the viewpoint of the student of genetics, and he expresses the hope that a study of chromosomes will enable a classification of lac insects into species and varieties to be made. The importance of physiological study is better appreciated when the effect of food on the insects is explained, and the author shows how the colour of the lac resin is derived from the colour of the food. A study of the food-plants common to two or more of the four species leads to the conclusion that it is safe to overlook the question of adaptability so far as these species are concerned. The lac secreted by the species of the two genera differs materially in appearance, composition and solubility; the honeydew excreted by *Lakshadia* contains sugar, while that of *Tachardia* has none; and the shape of the body, the stigmatic processes, the "spinoid process" and the anal hairs are different in the two genera as understood by the author, these differences in anatomical details indicating a variation in physiological activities. Additional evidence may be found in the appearance of the larvae, the difference in the larval swarming periods, and finally in the fact that *Lakshadia* produces both winged and wingless males, and is therefore less primitive, in the author's opinion, than *Tachardia*, which has only winged males. The author bases his contention that the two species of *Lakshadia* found on *S. talura* and on *Ficus mysorensis* and other figs respectively are distinct, on a study of the lac secreted, the difference in size, the food-plants, reproductive activity (one having two broods a year and the other appearing to be unique in being trivoltine), and finally on the difference between their associated insect fauna and micro-flora.

The different lac insects represent different worlds of symbiotic life, each insect becoming a habitat for certain species of micro-organisms, and just as the biochemist can ascertain the different enzymes secreted by microbes and give his organisms enzymic formulae, so it is possible to obtain a physiological formula for each lac insect that will really imply all the potentialities of the micro-flora within it. The climate of Mysore, by affecting the symbiotic yeasts, may explain the difference in reproductive powers between various species. A consideration of

[*Mr. F. Laing, of the British Museum, informs us that the genus *Lakshadia* would appear to fall automatically to *Tachardia*, Blanch., as it either embraces *T. lacca*, Kerr, as understood by authors, or new species congeneric with it. *Tachardia*, Madhihassan, is apparently congeneric with *Tachardina*, Ckll.—ED.]

the parasites of lac insects shows that each seems to exercise a strict monopoly over its host ; but the associated insect fauna seems to be only indirectly connected with the lac insects, these hosts being, as it were, cultures of certain organisms. The attraction of Chalcid parasites to odours must be considered, as well as the volatile esters of fatty acids that might be secreted by the yeasts. The entire absence of yeasts would make an insect immune from those parasites that are attracted only by the activity of certain organisms, and this seems to the author to provide a physiological link between the parasitic insect fauna and the symbiotic micro-flora.

The lac of the species on *Ficus* is usually not worth harvesting on account of the destruction wrought by the moth, *Eublemma amabilis*, but the latter does little damage to the lac of the species on *Shorea*, because it is kept in check by the parasites *Brasema annulicaudis* and *Bracon tachardiae*. A new Chalcid is regarded as parasitic on *E. amabilis* feeding on the lac of both species of *Lakshadia*. The beetles *Berginus maindroni*, *Tribolium castaneum* (*ferrugineum*), and *Cathartus advena*, and the larvae of the moths, *Anatrachyntis falcatella* and *Holcocera pulverea*, and of a species of *Chrysopa* have only been found associated with the species on *Shorea*. Some other undescribed or inadequately described Chalcid parasites of these Coccids are recorded.

In the case of the two species of *Tachardia*, one being found on *Pongamia glabra*, and the other on *Ixora parviflora*, the author relies for their differentiation, apart from the points obtained from their size and colour, upon the presence or absence of symbiotic organisms.

Names are given to other alleged new species of lac insects, but they are not accompanied by any recognisable diagnosis, and it is to be regretted that the author did not confine himself to the biological aspect of these problems until he had made himself conversant with at least the elementary principles of zoological nomenclature.

HIBBS (B.). **Seychelles : Annual Report on Agriculture and Crown Lands, 1921.**—9 pp. Victoria, 1922. [Received 12th November 1923.]

The beetle, *Melitomma* [*insulare*], is prevalent in many localities in the Seychelles, and planters are being urged to co-operate with the Department of Agriculture in treating the affected coconut trees. A fairly large hole should be made with a gouge on the part attacked. The infested tissue should be removed and burnt and the holes coated with coal-tar or whitewashed with lime [*cf. R.A.E.*, A, ix, 275].

FERRIS (E. B.) & RICHARDSON (F. B.). **The Satsuma Orange in South Mississippi.**—*Mississippi Agric. Expt. Sta.*, Bull. 217, 28 pp., 4 figs. A. & M. College, Miss., April 1923. [Received 12th November 1923.]

The chief pests of satsuma oranges [a variety of *Citrus nobilis*] in Mississippi are whiteflies ; chaff scale [*Parlatoria pergandei*] ; purple scale [*Lepidosaphes beckii*] ; Florida red scale [*Chrysomphalus aonidum*] ; rust mite [*Eriophyes oleivorus*] and red spiders. All these can be kept in check by consistent spraying, for which a schedule is given. It is not likely that fumigation will have to be resorted to, as in California. The orange dog butterfly [*Papilio thoas*] may cause partial

or complete defoliation in young trees, but the caterpillars are generally found on only a small percentage of the trees and hand-picking is a practical method of control.

PATCH (E. M.) & WOODS (W. C.). **The Blueberry Maggot.**—*Maine Agric. Expt. Sta.*, Bull. 308, pp. 77–92, 2 figs. Orono, Me., November 1922. [Received 12th November 1923.]

Much of the information regarding *Rhagoletis pomonella*, Walsh (blueberry maggot) contained in this bulletin has previously been noticed [*R.A.E.*, A, iv, 262]. The adult flies do not emerge until fully 6 weeks after the bushes have flowered, and the eggs are deposited directly in the berry. While the maggots are at their maximum numbers soon after the middle of August, their presence is more noticeable after that date than before. By mid-August all stages of the maggot are present. After about 14 days in the berry, the maggot leaves the fruit and pupates in the ground near the surface. The winter is passed in this stage, the adults beginning to emerge about the middle of the following July.

Attempts have been made, both in the laboratory and in the field, to induce the adults bred from apples to oviposit in blueberries (*Vaccinium* spp.), but without success. Apparently there are at least two distinct biological races of *R. pomonella*, the one breeding in apple and related fruits and the other in smaller fruits such as blueberry or huckleberry (*Gaylussacia baccata*). In Maine, the blueberry maggot does not seem to migrate to apple, or *vice versa*. The Braconid, *Opius melleus*, Gahan (*Biosteres rhagoletis*, Richm.) is a parasite of the larvae of *R. pomonella*, the parasitised larva generally growing normally and forming a puparium from which the adult parasite emerges about midsummer or later.

There is no very successful method of dealing with *R. pomonella* in blueberries, but certain suggestions are made that might lead to the production of better fruit. Berries from badly infested areas should be canned by the middle of August. If some method of eliminating the green fruit at the factory could be devised, this would not only give sound fruit, but would improve the quality, as by the time the last clusters have ripened much of the fruit is past its prime and often drops from the bushes. The harvested berries should be dealt with as rapidly as possible, as infestation increases with every day of storage. If raking the fruit (which is the method of harvesting it) could be continued until 1st September, or later, and the fruit cooked, the numbers of maggots in the field would be reduced, and the adults ovipositing in the next season would be substantially fewer. Many pupae in the soil could be destroyed by biennial burning of waste land where such exists immediately adjoining the fields, which are regularly burnt over every three years or so. Too drastic burning might, however, have deleterious effects on the soil from the point of view of blueberry growing. If growing could be suspended for a year and the bushes cut down or ploughed under, this would be a successful measure against the insect, but what its effect on blueberry culture would be is not known. The minimum possible quantity of ungathered fruit should be left in the field, and, wherever possible, windbreaks should be destroyed, as the flies seem to prefer sheltered places for oviposition. Waste fruit at the canning factories should be disposed of immediately by any convenient method, such as burning or burying.

Barber (G. W.). U.S. Bur. Ent. **A Note on a recently introduced Leafhopper.**—*Psyche*, xxx, no. 5, pp. 155–157, 1 fig. Boston, Mass., October 1923.

Allygus mixtus, F., was found in numbers on a beech tree in Massachusetts in 1920 and 1921, and seemed to be increasing yearly, but in 1922 only two individuals were found, one occurring on the same tree. In England, where it is a common species, it is said to feed on oak; it has not been seen on oak in Massachusetts, but the immature stages have not been observed. There are now three species of *Allygus* known in the United States, namely *A. gutturosus*, Ball, *A. modestus*, Fieb., and *A. mixtus*, F.

Silvestri (F.). **Descriptiones Termitum in Anglorum Guiana repertorum.**—*Zoologica*, iii, no. 16, pp. 307–321, 5 pls. New York, 1st October 1923.

The new termites described from British Guiana are *Hamitermes excellens*, *Capritermes bodkini*, *C. bodkini* var. *modestior*, and *Syntermes parallelus*.

Morrison (H.). U.S. Bur. Ent. **On Three apparently New Species of *Termitaphis* (Hem. Het.).**—*Zoologica*, iii, no. 20, pp. 403–408, 1 pl. New York, 1st October 1923.

Silvestri's key to the species of the genus *Termitaphis* is modified by the author to include the following new species:—*T. guianae*, from nests of *Leucotermes crinitus*, Emrsn., in British Guiana; and *T. trinidadensis* and *T. insularis*, both from nests of *L. tenuis*, Hag., in Trinidad.

Gowdey (C. C.). **The Coccidae of Jamaica.**—*Dept. Agric. Jamaica*, Ent. Bull. no. 1, 1921, 49 pp. Kingston, 1921. [Received 19th November 1923.]

A general account is given of Coccids, their life-history and habits and natural enemies, and the usual remedial measures are reviewed. A key to the subfamilies recorded in Jamaica is given, and also a short description of each species, with its food-plants. A separate list is also included of the food-plants with the species that feed on each.

Gowdey (C. C.). **The Principal Insect Pests of Tobacco in Jamaica.**—*Dept. Agric. Jamaica*, Ent. Circ. no. 9, 6 pp. Kingston, 1923.

Tobacco suffered severely from insect pests in 1921 and the outlook in this respect is not promising. The more important pests are the Sphingids, *Protoparce sexta jamaicensis*, Kirby, and *Deilephila* (*Celerio*) *lineata*, F. The former is by far the more important, and feeds on tomato, pepper and several uncultivated plants, besides tobacco. The life-history is described [*R.A.E.*, A, xi, 4]. The remedies suggested are hand-picking of the larvae, and dusting or spraying with Paris green or lead arsenate, the former being preferable on account of its quicker action, as the larvae are voracious feeders and cause much damage in a short time. Two parasites have been reared from the larvae, the Tachinid, *Sturmia distincta*, Wied., and the Braconid, *Apanteles congregatus*, Say.

D. lineata, F., feeds on several succulent weeds, and has only lately been observed to be a pest of tobacco, so that its life-history has not been thoroughly studied. It occurs most abundantly from April to June and from October to December. The Chalcid, *Chalcis robusta*, Cress., has been reared from the larvae.

Several species of cutworms attack tobacco in Jamaica, especially *Prodenia ornithogalli*, Guen., *Lycophotia infecta*, Ochs., and *Xylomyges sunia*, Guen., the first being apparently the most widespread and destructive. The usual remedial measures, including poison baits, are recommended. Various Tachinids are known to attack cutworms, but do not seem to be of much value in this connection. *Heliothis* (*Chloridea*) *obsoleta*, Hb., attacks the young leaves in the centre of the tobacco plant, and these should be dusted with Paris green. As maize is the preferred food, a trap crop of this might be grown and then dusted when it is knee-high with 1 lb. Paris green to 20 lb. lime. The land should be deeply ploughed before the tobacco is planted. *Lasioderma serricorne*, F. (cigarette beetle) attacks the finished tobacco product in both the larval and adult stages. The methods of fumigation with carbon bisulphide and with hydrocyanic acid gas are explained. The pest can be killed by subjecting the infested material to a temperature of 125 to 130°F. for 10 to 12 hours, provided this would not damage the material. *Epitrix parvula*, F. (flea-beetle) feeds on the roots of tobacco in the larval stage and on the leaves when adult. Dusting with air-slaked lime, Paris green or tobacco dust is recommended. Several species of grasshoppers attack tobacco and should be destroyed by poison baits or by dusting the plants with Paris green.

Brèthes (J.). **Sur un Diptère mineur des feuilles de** *Salvia splendens* **et deux Hyménoptères, ses parasites.**—*Rev. Zool. agric. & appl.*, xxii, no. 6, pp. 153–158, 2 figs. Bordeaux, June 1923. [Received 12th November 1923.]

A fly resembling the European *Phytomyza affinis* has been observed at Buenos Aires mining the leaves of sage (*Salvia splendens*), and is described as *Phytomyza platensis*, sp.n. Two new Hymenopterous parasites have been reared from it, *viz.*, *Phytomyzophaga albipes*, gen. et sp.n., which was the more numerous and *Paracrias phytomyzae*, sp.n. Apparently these parasites may destroy as many as 90 per cent. of their host.

Palm (B. T.). **Verslag van het Deli Proefstation over 1 Juli 1922—30 Juni 1923.** [Report of the Deli Experiment Station from 1st July 1922 to 30th June 1923.]—*Meded. Deli Proefst.*, 2nd Ser., no. 29, 41 pp., 1 pl. Medan, Sumatra, 1923.

Measures worked out in Sumatra against caterpillar pests of tobacco have been noticed already [*R.A.E.*, A, xi, 40, 439]. Experiments are being made with dusting, which seems a promising method. The larvae of *Prodenia* [*litura*] seriously injured tobacco leaf in the drying sheds in some localities ; 10 per cent. of the leaves were injured even after they had been carefully examined before being brought into the sheds. Of 10,121 larvae taken on 660,960 leaves of standing tobacco from May to June, *Prodenia* represented 46 per cent., *Phytometra* (*Plusia*) 42, *Botys* 6 and *Heliothis* 6. Hydrocyanic acid gas fumigation is less harmful to quite fresh leaves than to dry or withered ones.

By increasing the dose of cyanide and decreasing the duration of fumigation a larger percentage of larvae may be shaken off the leaves and collected without increasing the injury to the leaves. The larvae are not killed, however, either with hydrocyanic gas or nicotine at the strengths permissible in practice. Attempts to infect caterpillar pests of tobacco with the insect-killing fungus, *Botrytis stephanoderis*, proved unsuccessful.

The results of experiments with 54 different combinations of insecticides against Aphids emphasised the need for repeated spraying by trained workers at the first appearance of the pests on tobacco. Aphids were very injurious from February to April. Data are being collected on the habits of the small green Capsid, *Dicyphus nocivus*, which occurs on tobacco in Deli and is closely allied to *D. nicotianae*, found in Java. The Pentatomid, *Nezara viridula*, injured seedling and field tobacco. The relation to tobacco of the grasshopper, *Phaneroptera gracilis*, infesting *Mimosa invisa*, is also being studied. Among grasshopper pests *Valanga* (*Cyrtacanthacris*) *nigricornis* was especially noticeable.

PALM (B. T.). **Bestrijding van plagen en ziekten in de tabakscultuur. Verslag van een studiereis in Europa en de Ver. Staten.** [The Control of Pests and Diseases in Tobacco Cultivation. Report of a Tour of Study in Europe and the United States.]—*Meded. Deli Proefst.*, 2nd Ser. no. 30, 54 pp., 6 pls. Medan, Sumatra, 1923.

The title of this paper indicates its contents.

HART (S. J. G.). **De lamtoro in verband met de** *Helopeltis*. [*Leucaena glauca* in connection with *Helopeltis*.]—*Algem. Landbouweekblad Ned.-Indië*, viii, no. 15, pp. 477–478. Bandoeng, 13th October 1923.

Referring to the protection of tea from *Helopeltis* by hedges of green manure plants [*R.A.E.*, A, xi, 542] the author states that "lamtoro" [*Leucaena glauca*] protects tea from attack if grown as a thick hedge in alternate rows, being superior to *Tephrosia*. It is possible that the crown of closely-planted *Albizzia* may exercise the same protective action that *Leucaena* does closer to the ground, *i.e.*, as a mechanical shield against the successive waves of infestation from a focus of *Helopeltis*. *Leucaena* may, however, produce a substance unfavourable to the development and reproduction of *Helopeltis*, or its action may be due to its effect as a manure in strengthening the tea plants.

PAILLOT (A.) & FAURE (J. C.). **Culture du Pyrèthre et utilisation sur place de la récolte.**—*C. R. Acad. Agric. France*, ix, no. 31, pp. 806–809. Paris, 1923.

The cultivation of pyrethrum has been undertaken experimentally at Saint-Genis-Laval and has proved very successful. It was found most advantageous to gather the flowers at the moment when the majority were beginning to open, cutting the peduncles with a sickle just above the leaves at the base of the stalk. The crop is dried in shelter and shade, and then ground to powder, which is stored in closed

receptacles. A satisfactory insecticide can be made by soaking 5 per cent. of this powder in water with 2 per cent. of white soap and diluting the whole with its own weight of water for use. This will keep for several weeks without special precautions.

In the experimental field of 370 sq. yards, 123 lb. of pyrethrum powder was obtained. A normal dosage is 5½ lb. of powder to 22 gallons, so that the total crop gave about 500 gallons of spray. In 1923 the crop was a smaller one, owing to the abnormal dryness and heat, which prevented a second flowering in August-September.

Treatments were applied successfully against the following insects :— the Halticids, *Phyllotreta consobrina* and *P. nemorum*, on cabbages the best results being obtained with two applications at a few days' interval ; the caterpillars of *Pieris brassicae* and *P. rapae*, the first treatment being given when the majority of larvae had hatched but not yet dispersed, and a second application later ; Aphids, particularly the green peach aphis [*Myzus persicae*], on which pyrethrum acts in much the same way as nicotine spray but is more economical ; and the vine moths [*Clysia ambiguella* and *Polychrosis botrana*], the first generation larvae being destroyed in numbers if the fruit is well covered with the spray.

In view of the results of these tests, it is considered advisable to grow some pyrethrum on the majority of agricultural holdings, but an apparatus requires to be devised that will render possible the preparation of the powder on the spot.

Chevalier (J.) & Dantony (E.). **Action toxique du principe insecticide des fleurs de pyrèthre.**—*C. R. hebdom. Acad. Sci.*, clxxvii, no. 21, pp. 1077–1078. Paris, 1923.

The practical results obtained by the employment of pyrethrum as an insecticide have fully confirmed anticipations, and its extended use is limited only by its price. Preparations made from the whole plant cut at blossom time after most of the flowers had been gathered were found to be as effective as those made with the flowers alone, but a dose 6–7 times as large was necessary. Preparations made from the residue of the plants, harvested at the beginning of October, were more toxic, requiring only 3–4 times the amount of a preparation made from the flowers only. *Clysia ambiguella* was killed in a few minutes by an emulsion containing 1 lb. pyrethrum flowers to 80 gals., but was not killed by a commercial alkaline preparation of soap emulsion a year old containing 12 times the quantity of pyrethrum flowers. If a commercial preparation of soap and pyrethrum is to be still toxic to insects after some months, it must be hypertoxic at the time of manufacture. What is required, therefore, is to obtain the stabilisation of the active principle of pyrethrum preparations, in order to diminish the amount of flowers of pyrethrum necessary and thus to lower the price of the preparation.

Faes (H.) & Staehelin (M.). **La destruction du ver blanc ou larve du hanneton** (*Melolontha vulgaris*).—*Progrès agric. & vitic.*, lxxx, no. 46, pp. 493–497. Montpellier, 18th November 1923.

This paper on soil fumigants against larvae of *Melolontha melolontha* (*vulgaris*) has been noticed from another source [*R.A.E.*, A, xi, 528].

Marchal (P.). **Le Doryphora** (*Leptinotarsa decemlineata*, **Say). Insecte destructeur de la Pomme de terre.**—*Rev. Zool. agric. & appl.*, xxii, no. 7, pp. 177–191. Bordeaux, July 1923.

An account is given of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in America, and of its recent appearance in Gironde. The methods by which it may be most successfully dealt with are discussed [*R.A.E.*, A, xi, 16, 232, etc.].

Feytaud (J.). **Sur une apparition d'***Icerya purchasi* **dans un jardin d'Arcachon.**—*Rev. Zool. agric. & appl.*, xxii, no. 7, pp. 196-201, 2 figs. Bordeaux, July 1923.

The appearance of *Icerya purchasi* in a garden at Arcachon (south of France) is recorded, the infestation being traced to a consignment of plants from Antibes, *Mimosa baileyana* and *M. decurrens* showing the presence of the Coccid. Every effort was made to capture and kill all the Coccids present, and neighbouring trees and plants were all searched for signs of infestation. In spite of every precaution, mimosas in the same garden showed slight infestation in the following year (1922), when the same measures were resorted to. By 1923 the infestation seemed to have been stamped out. Attention is called to the value of the Coccinellid, *Novius cardinalis*, in view of possible future invasions of the pest.

Voukassovitch (P.). **Sur la biologie de deux Hyménoptères parasites de la Pyrale de la vigne.**—*C. R. hebdom. Acad. Sci.*, clxxvii, no. 19, pp. 906–908. Paris, 1923.

Two Ichneumonid parasites of the vine moth [*Sparganothis pilleriana*, Schiff.], *Goniozus claripennis*, Först., and *Angitia fenestralis*, Holmgr., are reported from Haute-Garonne. Of several hundred larvae examined 5 per cent. were parasitised by *G. claripennis* and 1 per cent. by *A. fenestralis*. All stages of the larvae are attacked.

Malenotti (E.). **Le cavallette e la teoria delle fasi.** [Locusts and the Phase Theory.]—Reprint, 6 pp., from *Il Coltivatore*, no. 28. Casale Monferrato, 10th October 1923.

This is a brief exposition of Uvarov's theory [*R.A.E.*, A, ix, 561], which is considered to be the most important discovery yet made in the biology of locusts.

Silvestri (F.). **Contribuzioni alla conoscenza dei Tortricidi delle Querce. I-II.** [Contributions to a Knowledge of the Tortricids of Oaks. I–II.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric.*, xvii, pp. 41–107, 47 figs. Portici, 1923.

Tortrix viridana, L., is found throughout Europe, as well as in Asia Minor and Morocco. Its usual food-plants are species of *Quercus*, but there are occasional records from various other trees. The adults appear from the end of May to the end of June, according to the locality and elevation. The eggs are laid in pairs on the bark of twigs and are completely concealed by débris, etc. Pupation takes place in a cocoon within the folded leaf that formed the shelter of the mature larva.

As a rule the damage done by *T. viridana* is negligible, but in some years the acorn crop is lost, and if outbreaks occur for several consecutive years the growth of the trees may be checked and the smaller branches may die. The trees themselves are only killed when the attacks coincide with other unfavourable influences.

After an outbreak has lasted 3 or more years it is generally controlled by a number of factors, chiefly the increase of natural enemies. Predatory enemies include birds, spiders, a Carabid, *Calosoma inquisitor*, L., the Diptera, *Empis livida*, L., and *Neoitamus cyanurus*, Lw., and the Odonata, *Enallagma cyathigerum*, Chp., *Agrion puella*, L., *Anax formosus*, Lind., and *Calopteryx virgo*, L. Numerous parasites have been recorded. The following were bred in Italy by the author from 1916 to 1918, and notes on their bionomics are given. Hymenoptera: Ichneumonidae. *Omorgus difformis*, Gmel., *Pimpla exterminator*, F., *P. maculator*, F., *P. rufa*, Gm., *P. nucum*, Ratz., *Trichomma enecator*, Rossi, and *Phaeogenes stimulator*, Grav. Braconidae. *Meteorus cinctellus*, Nees, *Eubadizon extensor*, L., recorded only from Portugal, and *Apanteles emarginatus*, Nees. Proctotrupidae. *Parasierola gallicola*, Kieff. Chalcididae. *Chalcis intermedia*, Nees, *Comedo larvarum*, L., which is normally a parasite of *Cheimatobia brumata*, and *Eutelus tibialis*, Westw., hitherto recorded as a parasite of Cynipids. Diptera: Tachinidae. *Nemorilla maculosa*, Mg., *Zenillia roseanae*, B.B., *Phytomyptera nitidiventris*, Rond., *Discochaeta euonymellae*, Ratz., *Compsilura concinnata*, Mg., *Neopales pavida*, Mg., and *Actia pilipennis*, Fall. As none of the above parasites is limited to *T. viridana*, it is not advised that they should be specially bred or fostered, though further research may show if help is desirable in the case of the more useful species.

Artificial control is not an economic measure except in very special cases, when a spray of 1 per cent. lead arsenate paste or ½ per cent. powder may be used.

Tortrix loeflingiana, L., occurs throughout Europe and in Asia Minor. At Portici the adults appear early in June. The eggs are laid either singly or in small groups on the bark of twigs, and are not much concealed with débris as in the case of *T. viridana*. The larvae hatch in the following spring. They attack both *Quercus ilex* and deciduous oak. Towards the end of May the mature larva spins its cocoon within a case formed of the leaves of a shoot. The pupal stage lasts 11–12 days. A severe attack may spoil the acorn crop. No parasites of this moth seem to have been noticed hitherto, but the author has obtained the Ichneumonids, *Omorgus difformis*, and *Trichomma enecator*, and the Braconids, *Microdus dimidiator*, Nees, and *Copidosoma tortricis*, Waterston, recorded in England as a parasite of *Oxygrapha* (*Peronea*) *comariana* [*R.A.E.*, A, viii, 516].

Lapazarán (J. C.). **Plaga sobre la remolacha azucarera.** [A Pest of Sugar-beet.]—*Bol. Agric. Tec. & Econ.*, xv, no. 178, pp. 935–939. Madrid, 31st October 1923.

Sugar-beet in the districts around Saragossa has been severely attacked by the Noctuid, *Laphygma exigua*, Hb., the normal food-plant of which is *Polygonum persicaria*. The first generation passed unnoticed; the second—in June and July—was so extensive as to require immediate measures; and the third spread throughout the area. The fourth generation moths oviposited under clods of earth, the eggs being the

hibernating stage. The eggs laid by the second and third generations were deposited on the foliage of lucerne, pimentos, sugar-beet and such plants as *Convolvulus arvensis*, on which the young larvae fed before proceeding to attack crops. The egg stage lasts 2–3 days, the larval 11–12, the pupal 10, and the adult 3–5, so that the complete life occupies 26–30 days. As some 81,000 acres were involved, all available insecticides had to be used. The two sprays that proved most successful were composed of sodium arsenate 1 lb., newly slaked lime 1–2 lb., water 20 gals., and copper arsenite 1 lb., newly slaked lime 1–1¼ lb., water 25 gals. Spraying should be done immediately the young larvae appear on the leaves. The pupae near the roots may be destroyed by flooding the fields. Destruction of the moths by night is a useful measure that requires, however, very competent workers. The majority of the hibernating eggs can be destroyed by irrigation and ploughing, but a watch should be kept for any larvae that may appear subsequently.

Crop Pest and Nursery Inspection Law.—*Wisconsin State Dept. Agric.*, Bull. 57, 5 pp. Madison, Wis., October 1923.

This is a recapitulation of crop pest and nursery inspection laws and quarantine orders in force in Wisconsin, including quarantines against the gipsy moth [*Porthetria dispar*] and brown-tail moth [*Nygmia phaeorrhoea*] and the European corn borer [*Pyrausta nubilalis*], most of which have been noticed in this *Review*. Quarantine no. 6, effective 1st October 1923, against the alfalfa weevil [*Hypera variabilis*] prohibits the importation of lucerne and hay of all kinds and cereal straw grown or stored in the states of Utah and Wyoming and parts of Colorado, Idaho, Nevada, California and Oregon.

Modification of Fruit and Vegetable Quarantine. Amendment No. 1 to Regulations Supplemental to Notice of Quarantine No. 56.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 3 pp. typescript. Washington, D.C., 23rd October 1923.

This amendment, which came into force 1st November 1923, modifies the Fruit and Vegetable Quarantine [*R.A.E.*, A, xi, 518] to allow for the importation of such special fruits as can be accepted by the United States Department of Agriculture as free from risk of carrying injurious insects, including fruit-flies (TRYPETIDAE).

By an addendum dated 27th October 1923 the entry has been approved of hothouse grapes when they can be considered absolutely free from risk, sour oranges from Spain for the manufacture of marmalade and avocados from the West Indies.

Extension of European Corn Borer Quarantine.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 27th September 1923.

Regulations supplemental to Notice of Quarantine no. 43 (second revision) [*R.A.E.*, A, x, 595; xi, 343] are further amended to include new areas of invasion of the European corn borer [*Pyrausta nubilalis*, Hb.].

Buchanan (L. L.). **Two European Weevils established in North America (Coleoptera: Curculionidae).**—*Ent. News*, xxxiv, no. 9, pp. 280–281. Philadelphia, Pa., November 1923.

Hypera (*Phytonomus*) *rumicis*, L., and *Notaris bimaculatus*, F., appear to have become established in North America and are recorded from various localities in the United States, the former also from Alberta.

N. wyomingensis, Chitt., has proved to be a synonym of *N. bimaculatus*.

Jones (C. P.). **Determination of Sulphur Compounds in Dry Lime-sulphur.**—*Jl. Agric. Res.*, xxv, no. 7, pp. 323–336, 2 figs., 3 tables. Washington, D.C., 18th August 1923. [Received 19th November 1923.]

The following is the author's summary :—The three forms of sulphur, monosulphide, residual, and thiosulphate sulphur, contained in lime-sulphur powders may be easily and accurately determined by the passage of carbon dioxide through a solution of the polysulphide. The accuracy of the method is based upon the fact that carbon dioxide separates quantitatively the monosulphide sulphur from the thio-sulphate and residual sulphur. The use of this method allows for a complete separation of the residual from the thiosulphate sulphur, thus enabling accurate estimation of both.

The method is entirely free from any laborious process of filtering and uncertainty regarding end-points in the use of indicators.

The application of this method eliminates all errors due to hydrolysis of lime-sulphur compounds in aqueous solutions and also the reacting influences of the carbon dioxide and oxygen of the atmosphere.

The use of hydrated sodium dioxide for the absorption of sulphuretted hydrogen has a two-fold advantage. The alkalinity of the solution acts as a binding agent, while the 20 per cent. of available oxygen acts in the capacity of a powerful oxidiser.

Leiby (R. W.) & Hill (C. C.). U.S. Bur. Ent. **The Twinning and Monembryonic Development of *Platygaster hiemalis*, a Parasite of the Hessian Fly.**—*Jl. Agric. Res.*, xxv, no. 8, pp. 337–350, 5 pls. Washington, D.C., 25th August 1923.

This is a detailed study of the embryonic development of the Chalcid, *Platygaster hiemalis*, parasitic on the Hessian fly [*R.A.E.*, A, xi, 562]. The following is an extract from the authors' summary :—*Platygaster hiemalis* develops both monembryonically and polyembryonically in the Hessian fly [*Mayetiola destructor*], the adult parasites emerging in late summer from the host puparium. An average of 6·31 individuals, often of both sexes, is bred from each puparium. The twinning development in insects, here described for the first time, is a simple type of polyembryony. On the other hand, the monembryonic development of this parasite is very highly specialised. Since *P. hiemalis* exhibits both types of development, it furnishes a clue to the origin of polyembryony in insects. It is believed that the monembryonic development of some of the eggs, and the fact that some of the eggs of a group are inseminated while others of the same group are not, will account for the origin of mixed broods of the parasites, and the occurrence of single individuals of a sex different from that of the others of the brood.

Baker (A. C.). U.S. Bur. Ent. **An Undescribed Orange Pest from Honduras.**—*Jl. Agric. Res.*, xxv, no. 5, pp. 253–254, 2 pls. Washington, D.C., 4th August 1923. [Received 19th November 1923.]

Aleurodicus (*Metaleurodicus*) *manni*, sp.n., is described from Honduras, where it is abundant on orange. It is kept in check by parasites, but it is of potential importance in other regions, where it might easily become established without these parasites.

Fracker (S. B.). **Division of Insect and Plant Disease Control.**—*Bienn. Rept. Wisconsin State Dept. Agric. 1921–1922*, Bull. 52, pp. 39–81, 16 figs., 4 maps, 1 table. Madison, Wis., 31st December 1922. [Received 19th November 1923.]

Rhopobota naevana, Hb. (black-headed vineworm) was the most destructive cranberry pest of the season. The larvae were found during the third week in May, and wherever they had not been controlled by flooding in May the second brood was abundant from 22nd to 28th June. *Peronea* (*Alceris*) *minuta*, Rob. (yellow-headed vineworm) and *Tortrix* (*Archips*) *rosaceana*, Harr. (oblique-banded leaf-roller) were observed in considerable numbers, but caused little injury on the whole. *Perrisia vaccinii*, Smith (*Cecidomyia oxycoccana*, Johnson) was first found on 5th June and was generally distributed throughout the State for the rest of the season. Experimental floods only destroyed 50 per cent. *Mineola vaccinii*, Riley (cranberry fruit worm) developed later in 1922 than usual, and as the abundant crop was earlier the percentage of injury was less than in 1921. Other pests were *Dichelia sulfureana*, Clemens (false yellow-headed vineworm), *Anthonomus suturalis*, Lec. (cranberry weevil) and an unidentified leaf-hopper.

The measures undertaken in various localities against the San José scale [*Aspidiotus perniciosus*] are described, together with the progress in bee disease control. The insecticide and fungicide inspection service is briefly reviewed. The reports indicated that 1921 was a year of serious outbreaks of pests, while 1922 was unusually free. The only outstanding outbreaks of insects in 1922 were in forest trees. A tussock moth, *Olene leucophaea*, S. & A., defoliated thirty to forty thousand acres of jack pine [*Pinus banksiana*], but the outbreak was brought to a close in July by the activities of the parasites, *Chalcis ovata*, Say, *Pimpla* (*Itoplectis*) *conquisitor*, Say, and *Theronia fulvescens*, Cress. *Hyphantria cunea*, Drury, caused serious injury to walnut, and *Bucculatrix canadensisella*, Chamb., appeared in numbers on birch in the autumn.

Chambers (E. L.). **The Grasshopper Campaign.**—*Bienn. Rept. Wisconsin State Dept. Agric. 1921–22*, Bull. 52, pp. 40–43, 1 fig. Madison, Wis., 31st December 1922. [Received 19th November 1923.]

A survey made in the end of May 1922, when the grasshoppers were just beginning to hatch, showed that a serious outbreak might be expected. The steps taken to prepare for the systematic employment of poison baits are described. Applications should be made when the insects have just hatched, as they do not move away for a few days. The need for co-operation amongst farmers is strongly emphasised. The cost of the poison and the approximate amount distributed are recorded.

CHAMBERS (E. L.). **Potato Spraying Demonstration Areas.**—*Bienn. Rept. Wisconsin State Dept. Agric. 1921-22*, Bull. 52, pp. 43-47, 2 figs., 1 table. Madison, Wis., 31st December 1922. [Received 19th November 1923.]

These demonstrations were undertaken in order to determine more accurately some of the factors responsible for variable results in potato spraying and to demonstrate methods on a commercial scale. The most satisfactory spray boom used was designed to spray the leaves from above and below. The control plots were sprayed with lead arsenate against the potato beetle [*Leptinotarsa decemlineata*]. The increase in yield resulting from application of Bordeaux mixture ranged from 17 bushels to an acre in the case of light infestations of potato leafhoppers [*Empoasca mali*] to 100 bushels in a district where they were more abundant. In this latter district the yield on one acre sprayed five times with a different equipment amounted to 128·6 bushels, showing a loss of 58 bushels from failure to cover the lower surface of the leaves. In the former district sprayed in this way the yield was 250 bushels, a loss of 15 as compared with the demonstration area.

FRANK (A.). **Diseases and Insect Pests of Raspberries and their Control.**—*Bi-Monthly Bull., W. Washington Expt. Sta.*, xi, no. 4, pp. 79–81. Puyallup, Wash., November 1923.

In view of the intensive cultivation of raspberries in Washington, the principal insect pests and diseases of the crop are briefly reviewed with remedies against them.

CORKINS (C. L.). **Grasshopper Control in Colorado.**—*Colorado Agric. Expt. Sta.*, Bull. 287, 19 pp., 16 figs. Fort Collins, Colo., June 1923. [Received 22nd November 1923.]

Grasshoppers are the most destructive pests of cereals and forage crops in Colorado. Notes on the bionomics and control of the following more important species are given, *Melanoplus bivittatus*, Say, *M. atlantis*, Riley, *M. femur-rubrum*, De G., *M. differentialis*, Uhl., and *Dissosteira longipennis*, Thomas. The need for organisation embracing the co-operation of all farmers and for adequate funds to carry on the campaign is emphasised.

CORKINS (C. L.). **Sodium Arsenite as a Killing Agent in Grasshopper Baits.**—*Colorado Agric. Expt. Sta.*, Bull. 280, 15 pp. Fort Collins, Colo., January 1923. [Received 22nd November 1923.]

Experiments to ascertain the possibilities of sodium arsenite as a killing agent in various poison bran-mash baits are described, as commercial crude white arsenic, containing from 90 to 98 per cent. As_2O_3, which is the standard killing agent in the United States and Canada, is often unsatisfactory owing to imperfect mixing. The results indicate that sodium arsenite, containing 50 per cent. As_2O_3, used in the strength of 1 U.S. pint to 100 lb. dry bran, which appears to be the optimum strength, is fully as effective as either the Kansas

bait or the standard formula, containing 5 lb. of 98 per cent. crude white arsenic. It seems also practically as effective as the Kansas bait containing 4 lb. Paris green to 100 lb. dry bran. It has advantages over white arsenic in mixing, cost, handling, and bulk, and is fully as efficient.

PARKER (R. L.). **Life-history Cycle of the Honey Bee.**—*Iowa: Rept. State Apiarist 1921*, pp. 43–48, 3 figs. Des Moines, Iowa [1922].

The life-history and development of the honey-bee is discussed, with a view to enabling the beekeeper to maintain strong and healthy colonies. The selection of larvae of the correct age for use as queens, rearing and mating, carrying the colony through the winter, and the question of sex-determination of the eggs are dealt with.

PAMMEL (L. H.). **Pollination of Interest to Beekeepers.**—*Iowa: Rept. State Apiarist 1922*, pp. 51–60. Des Moines, Iowa [1923].

The author summarises the literature regarding the rôle of the honey bee in the pollination of flowers.

HERTIG (M.). **The Normal and Pathological Histology of the Ventriculus of the Honey Bee, with Special Reference to Infection with** *Nosema apis*.—*Minnesota Agric. Expt. Sta.*, Tech. Bull. 13, pp. 109–140, 3 pls. Univ. Farm, St. Paul, Minn., July 1923.

This is a reprint of a paper noticed from another source [*R.A.E.*, A, xi, 357].

BAHR (L.). **Honningbiens Liv og Sygdomme.** [Life-history and Diseases of the Honey Bee.]—164 pp., 71 figs. Det veterinaer-medicinske Forlag, Copenhagen and Christiania, 1923. Price 5 *Kr.* (Danish).

The first part of this small book describes the morphology and life-history of the honey bee. In the second part its parasites and diseases are dealt with, and their symptoms, and remedies for them are discussed. Those that occur in Denmark are American foul brood, European foul brood, pickled brood, sac brood, *Nosema*-disease and paratyphus.

[RITCHIE (A. H.).] **Green Scale of Coffee.**—*Dar-es-Salaam Times*, iv, no. 47, p. 9. Dar-es-Salaam, 6th October 1923.

During a ten weeks' survey of the Kilimanjaro and Meru coffee districts of Tanganyika, the green scale of coffee [*Coccus africanus*] was difficult to find over the entire area, probably in consequence of the presence of entomophagous fungi. It is thought that the pest can be kept well in check if planters watch for it and immediately prune off any infested twigs. It is suggested that the points where infestation are found should be marked, so that any further spread of the pest by wind, birds or ants can be traced and dealt with promptly. Proper attention to shade and mulching, to preserve the moisture balance of the plantation, and good and systematic cultivation should do much towards keeping the coffee plantations free from insect pests in general.

Nicholls (H. M.). **Report of the Government Microbiologist.**—*Tasmania Agric. & Stock Dept., Rept. 1922–23*, pp. 15–17. Hobart, 1923.

The Aphid, *Chermes pinicorticis*, is abundant throughout Tasmania, especially on *Pinus insignis*. On small trees it can be controlled by spraying periodically with kerosene emulsion, but on large trees the cost would be prohibitive. *Myzus cerasi* (cherry aphis) suddenly became unusually abundant during 1922, after having been practically unheard of in Tasmania, although it may have occurred in small numbers. Where it has been present, a spray of strong lime-sulphur or oil should be given to destroy the winter eggs; this should be applied just before the buds begin to open in the spring. The green peach aphis [*Myzus persicae*] was abundant locally on a number of plants; tobacco sprays should be applied regularly to infested trees. The currant borer [*Aegeria tipuliformis*] [*R.A.E.*, A, xi, 153] continues to increase in the region of Hobart, and very little is being done to check it. A native Scolytid, *Acacicis abundans*, which has hitherto been known as a pest of wattles [*Acacia*] and other native trees, has recently done considerable injury by boring in the lead sheathing of telephone cables. It may be seen flying in clouds about wattle trees in Hobart, and in houses in the city it attacks the wood of rafters and floors.

A case is recorded of a house so heavily infested with mites that it was uninhabitable. Fumigation with hydrocyanic acid gas had no effect, but the burning of about 4 lb. of sulphur in each room cleared the house entirely. The author has found that the skin of certain Acarids has the power of filtering out hydrocyanic acid gas poison, while the dense fumes of sulphur prevent the access of oxygen altogether and are therefore fatal.

MacGillavry (D.) & Corporaal (J. B.). *Dermestes carnivorus*, **F., te Amsterdam.**—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 128, pp. 124–126. The Hague, 1st November 1922. [Received 22nd November 1923.]

In an Amsterdam tobacco warehouse a parcel of 13 bales of raw tobacco from Cuba was found to harbour a large number of *Dermestes carnivorus*, F., with *D. vulpinus*, F., a few individuals of *Alphitobius piceus*, Ol., and one of *Necrobia ruficollis*, F. It is probable that *D. carnivorus* had migrated to the bales of tobacco in order to pupate, as *Dermestes* spp. feed on animal matter. The presence of *N. ruficollis* also points to an infestation proceeding in this manner.

Everts (E.). *Bruchus bixae* **Drapiez.**—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 133, pp. 199–201. The Hague, 1st September 1923. [Received 22nd November 1923.]

This note refers to the occurrence of *Bruchus bixae*, Drapiez, in imported seeds of *Bixa orellana*, which has already been noticed [*R.A.E.*, A, xi, 560].

Mokrzecki (Z.). **Biologisches über** *Phytometra gamma* **L.** [On the Biology of *Phytometra gamma*, L.]—*Polskie Pismo Ent.*, ii, pt. 3, p. 143. Lemberg, 1923.

This is an extract in German from an article already noticed from the Polish [*R.A.E.*, A, xi, 509].

KRASUCKI (A.). **Einige Worte über den Wiesenzünsler** (*Phlyctaenodes sticticalis* **L.**) **im Jahre 1921.** [A few words on *Loxostege sticticalis*, L., in 1921.]—*Polskie Pismo Ent.*, ii, pt. 3, pp. 144–154. Lemberg, 1923.

The recent widespread outbreak of *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., in Europe [*R.A.E.*, A, x, 255] is discussed, and a survey of the observations of many authors is given, much of the information having been noticed in this *Review*.

NIKOLSKI (V. V.). **Новые проблемы в изучении саранчевых насекомых.** [New Problems in the Study of Locusts.]—**Хлопковое Дело** [*Cotton Industry*], ii, no. 7–8, pp. 33–54. Moscow, 1923.

The paper contains an extensive critical review of recent theories by Uvarov [*R.A.E.*, A, ix, 561; xi, 304] regarding the bionomics and periodicity of locusts, and is based partly on original observations by the author on *Locusta migratoria*, L., in Turkestan. The explanation of larval movements by tropisms, and particularly by thermotropism as suggested by Uvarov, is not accepted by the author, who quotes some of his own observations showing that although there is a marked connection between temperature and behaviour of larval swarms, this connection is very complicated. It is suggested that the larval movements may depend on two causes: first, they may be an adaptation of instinct, enabling the larvae that climb up the grass-stems for moulting to escape being devoured by the others, since the latter, moving in a swarm, leave the moulting ones behind; secondly, they may have a deep physiological significance, and in this connection the author suggests that exact observations of the body temperature of the larvae in connection with their behaviour may assist in the solution of the problem.

The theory of phases introduced by Uvarov to explain the periodicity of locust invasions seems to the author not sufficiently supported by actual observations, but no definite alternative suggestion is made by him. The importance of physiological processes in the migration of adult swarms is very strongly emphasised, in full accordance with Uvarov's views.

ARKHANGELSKI (—). **Ворьба с итальянской саранчей (прусиком) в Мервском уезде с помощью отравленных приманок.** [Control of the Italian Locust in the Merv District by Poisoned Baits.]—**Хлопковое Дело** [*Cotton Industry*], ii, no. 7–8, pp. 130–134. Moscow, 1923.

Experiments with poisoned baits against *Calliptamus italicus*, L., in Turkestan have been made before, but with negative results, as they depended on using baits made of sawdust. The author also found that sawdust attracts the locust very little, but good results have been obtained with bran. Equally good results were attained with flour made of crushed cotton seed, and this latter substance has been used, on a very large scale and with great success, in the actual anti-locust campaign of 1923, the formula for the bait being 2 lb. sodium arsenite or Paris green, 40 lb. of the flour and 3 gals. water; this quantity

proved to be sufficient to cover 3 acres. Other substances tried in the experiments included horse-dung and husk of cotton seed, and it has been found that the price of the baits may be substantially reduced when the flour is mixed with manure, sawdust or cotton seed husk instead of being used pure.

Apart from poisoning, certain methods of cultivation are important for preventing outbreaks of *C. italicus* ; in particular, both the cotton fields and the strips of land separating them should be ploughed in autumn, and again in spring. An abundance of weeds in cotton fields is very favourable to the locust, and the control of weeds is thus important.

Pukhov (B. A.). **1. Сельско-хозяйственная энтомология в Оренбургском земстве за три года (1914-1916). 2. Отравленные приманки в борьбе с саранчевыми в Оренбургской губернии.** [1. Agricultural Entomology in the Orenburg Province in 1914–1916. 2. Use of Poisoned Baits for Grasshoppers in the Orenburg Province.]—**Извес. Московс. Энт. Ова.** [*Bull. Ent. Soc. Moscow*], ii, no. 2, pp. xxiv–xxv. Moscow, 1st October 1923.

A short account of entomological work is given, including successful experiments with poisoned baits for grasshoppers.

Shapinski (D. V.). **Из биологических наблудений над саранчевыми Челябинского уезда, Оренбургской губ.** [Biological Observations on Grasshoppers in the Tchelyabinsk District, Orenburg Province.]—**Извес. Московс. Энт. Ова.** [*Bull. Ent. Soc. Moscow*], ii, no. 2, pp. xxvi–xxix. Moscow, 1st October 1923.

Podisma (*Pezotettix*) *pedestris* has probably 6 larval stages, or 5 moults (the shedding of the amnion just after emergence from the soil not being counted), while the following species attain the adult stage after 4 moults only :—*Gomphocerus sibiricus*, *Arcyptera* (*Stethophyma*) *flavicosta*, *A.* (*S.*) *fusca*, *Psophus stridulus*, *Bryodema tuberculata*, *Celes variabilis*, *Dociostaurus* (*Stauronotus*) *brevicollis*, *Stenobothrus nigrogeniculatus* (*fischeri*), *Chorthippus* (*Stenobothrus*)*albomarginatus*, and *Stauroderus* (*S.*) *biguttulus*.

The emergence after hatching of larvae of *Gomphocerus sibiricus* and *Dociostaurus brevicollis* is described.

Savzdarg (E. E.). *Phytometra* (*Plusia*) *gamma* **в окрестностях Москвы летом 1922 года.** [*Phytometra gamma* in the vicinity of Moscow during the Summer of 1922.]—**Извес. Московс. Энт. Ова.** [*Bull. Ent. Soc. Moscow*], ii, no. 2, pp. 12–28. Moscow, 1st October 1923.

A detailed account is given of the observations made on the habits and seasonal history of *Phytometra gamma* during the outbreak of 1922 in the vicinity of Moscow, and previous work of other authors is reviewed. The remedial measures tried during the recent outbreak [*R.A.E.*, A, xii, 23] are discussed.

Shtcherbinovski (N. S.). **Совка-гамма и сорная растительность.** [*Phytometra gamma* and Weeds.]—**Извес. Московс. Энт. Ова.** [*Bull. Ent. Soc. Moscow*], ii, no. 2, pp. 29–37. Moscow, 1st October 1923.

During the outbreak in 1922 of *Phytometra* (*Plusia*) *gamma* an excellent opportunity was afforded for studying the weeds and wild plants on which it is found ; and a list of them is given. The relation between these plants and the abundance of *P. gamma* is discussed. The eggs are laid for preference on weeds rather than on cultivated plants. The most suitable ones for the larvae are Compositae, Cruciferae and Labiatae, among which the favoured food-plants are *Cirsium* spp., *Sonchus* spp., *Raphanus raphanistrum* and *Galeopsis* spp. The distribution of the larvae depends to a large extent on the phenological condition of the weeds at the time of the flight of the moths. Clean cultivation is thus essential, the destruction of the favoured weeds being of particular importance. The possible value of trap crops and of utilising weed-covered areas in this connection is discussed.

Parfentev (I. A.). **Обзор новейшей литературы по** *Phytometra* (*Plusia*) *gamma* **(1914-1922).** [Review of modern Literature on *Phytometra gamma* (1914-1922).]—**Извест. Московс. Энт. Ова.** [*Bull. Ent. Soc. Moscow*], ii, no. 2, pp. 38–44. Moscow, 1st October 1923.

The contents of this paper are indicated by its title.

Fedorov (S. M.). **Молдавская огневка** (*Cledeobia moldavica* **Esp., Lepidoptera, Pyralidae). Морфология, биология, и значение.** [*Cledeobia moldavica*, Esp. Morphology, Biology and Importance.]—**Извест. Московс. Энт. Ова.** [*Bull. Ent. Soc. Moscow*], ii, no. 2, pp. 45–56. Moscow, 1st October 1923.

The various stages of *Cledeobia moldavica*, Esp., are described ; it occurs in southern Russia and elsewhere in Europe and has also been recorded from North America. The present observations were made in the Tavris province during 1916. This Pyralid appears in great abundance at intervals of four years and may completely destroy the vegetation of the steppe, after which a different type of plant growth may appear. It is a serious menace to these pastures and consequently to sheep raising in the south of Russia.

The adults appear in the first half of May, and one may lay as many as 750 eggs, which are deposited in cracks in the soil or any similar suitable place. The larvae hatch in from 10 to 14 days and feed on the stems of the plants above ground. The winter is passed in the larval stage, pupation occurring in a cocoon in the soil towards the end of the following April. Natural enemies include birds and a Tachinid parasite.

Shapinski (D. V.). **Ортоптерологические заметки I. К биологии** *Chrysochraon dispar*, **Germ. II. Новые паразиты саранчевых.** [Orthopterological Notes. I. On the Biology of *Chrysochraon dispar*, Germ. II. New Parasites of Acrididae.]—**Извест. Московс. Энт. Ова.** [*Bull. Ent. Soc. Moscow*], ii, no. 2, pp. 57–69. Moscow, 1st October 1923.

Chrysochraon dispar has been observed laying its eggs in batches of 5–20, in the broken standing stems of *Angelica sylvestris*.

A Chloropid fly, *Siphonella palposa*, Fall., has been discovered near Moscow in the egg-masses of *Staurodera* (*Stenobothrus*) *apricarius*, up to ten per cent. of egg-masses being infested by the larvae, which are stated to be able to find them in the soil. Pupae of an unidentified Chalcid have also been found in eggs of this locust.

Nikolski (V. V.). **Азиатская Саранча или перелетная, болотная, тугайная, камышевая, тростниковая саранча.** *Locusta* (*Pachytylus* **Fieb.**) *migratoria* **L.** [The Asiatic Locust, *L. migratoria*, L.]—**Петроград. Станция Защиты Растений от Вредителей** [*Petrograd Sta. Plant Protect. from Pests.*], 23 pp. Petrograd, 1922. [Received 20th November 1923.]

A short popular account is given of the bionomics and control of *Locusta migratoria*, L.

Boldirev (V. F.). **Инструкция по борьбе с „совкой-гаммой"** (*Plusia gamma*, **L.**) **и ее гусеницей „льняным червем."** [Instructions for the Control of *Phytometra gamma*, L., and its Larva, the Flax Worm.]—**Издание Озра Наркомзема** [*Publ. Ozra Nat. Com. Agric.*], 29 pp. Moscow, 1923.

During 1922 *Phytometra* (*Plusia*) *gamma*, L., was unusually abundant and widely distributed in Russia, attacking a great variety of crops. It was particularly injurious to flax, and to leguminous and root crops. Its life-history is outlined, and the injury caused to the various crops is described. The remedial measures discussed include clean cultivation, digging of trenches to prevent migration, collection of larvae, and spraying. The actual spray material depends on the crop for which it is to be used, recommendations for suitable ones being given.

During the outbreak under discussion parasites were comparatively scarce, but the larvae of the autumn generation were attacked in large numbers by a bacterial wilt.

Shembel (S.). **О борьбе со сверчком-вредителем** (*Gryllus desertus*, **Pall.**) [On the control of the injurious Cricket, *Gryllus desertus*, Pall.]—**Астрах. Станц. Защиты Раст. от Вредителей** [*Astrakhan Sta. Protect. Plants*], Leaflet no. 31, 4 pp. Astrakhan, January 1923. [Received 26th November 1923.]

Gryllus desertus, Pall., was particularly destructive in Astrakhan during 1922, attacking cereals, fruit, stored products, and even leather and wood. It is most injurious during the flood period in spring, as it is forced to mass on the unflooded areas, and the remedial measures should be applied at this time. Poison baits containing bran, sawdust or maize and arsenic or Paris green are recommended, instructions being given for their preparation.

Very little is known of the life-history of this cricket. As the floods decrease, the adults gradually disappear, and they cannot be found at all by July. The larvae of the succeeding generation emerge about September, but do not cause any appreciable damage, they apparently hibernate in this stage and produce the destructive adults of the following spring.

Ilinski (A. M.). **Список Вредителей Сельского Хозяйства Астраханского Края.** [List of Agricultural Pests of the Astrakhan Region.]—**Записки Астраханс. Станц. Защиты Раст. от Вредителей** [*Notes Astrakhan Sta. Protect. Plants*], i, pt. 2, pp. 1–44. Astrakhan, 1923.

This list of insect pests has been compiled from the observations of N. L. Sakharov and others during 1912–1920, and covers the greater Astrakhan region, including part of Tzaritzin. The pests are tabulated under the crops affected, and their seasonal prevalence and the part of plant attacked are indicated. A systematic classification is also given, and an extensive bibliography appended.

Vimmer (A.). **Příspěvky k metamorfose některých Ceských Anthomyii. (Dipt.).** [On the Metamorphosis of some Czech Anthomyiids.]—*Časopis Českoslov. společ. ent.*, xix (1922), pts. 1–2 & 3–6, pp. 3–12 & 71–77, 5 pls. Prague, April 1922 and March 1923. [Received 23rd November 1923.]

The early stages of Anthomyiids occurring in Czecho-Slovakia are discussed, including *Anthomyia* (*Paregle*) *radicum*, L., *Pegomyia nigritarsis*, Zett., *P. hyoscyami*, Panz. (*conformis*, Fall.), *P. bicolor*, Weid., *Fannia* (*Homalomyia*) *manicata*, Mg., and *F.* (*H.*) *canicularis*, L.

Drastich (L.). **Mšice Republiky Československé, zvláště okolí Ostravského.** [Aphids of the Czecho-Slovakian Republic, particularly the vicinity of Ostra.]—*Časopis Českoslov. společ. ent.*, xix (1922), pts. 3–6, pp. 31–62, 11 figs. Prague, March 1923. [Received 23rd November 1923.]

A list is given of the Aphids occurring in Czecho-Slovakia with their food-plants and a key for their determination. A general account is also given of the biology of Aphids and the methods of destroying them, formulae for insecticides being quoted. An extensive bibliography is appended.

Baudys (E.). **Fauna Čechosloveniae I. Zoocecidia. Zoocecidie nové pro Čechy iv.** [Gall-forming Insects new to Czecho-Slovakia.]—*Časopis Českoslov. společ. ent.*, xx, pt. 1–3, pp. 56–67, 9 figs. Prague, 1st June 1923. [Received 23rd November 1923.]

A list is given of gall-forming insects occurring in Czecho-Slovakia arranged under the plants attacked.

Urban (C.). *Phytonomus pedestris* **Payk. und seine Entwicklung.** [*P. pedestris* and its Development.]—*Ent. Blätter*, xix, no. 3, pp. 127–128. Berlin, 30th September 1923. [Received 27th November 1923.]

The adults of *Hypera* (*Phytonomus*)* *pedestris*, Payk., are common in Germany on vetches in May and June, feeding on the stems, leaves and flowers. Captive females oviposited in the stems. Larvae hatched in about a week, and they were taken on *Vicia cracca* in June and

*[The name *Phytonomus*, Schh., is an absolute synonym of *Hypera*, Germ., and therefore cannot be used for any division of that genus. In any case, there is no really satisfactory line of division between the winged and wingless species of *Hypera*.—Ed.]

July. They feed on the same parts of the plant as the beetles. Pupation occurs in July and sometimes at the end of June, and lasts 6 days, but the beetle does not emerge until 2 days later.

Eggers (H.). **Seltene und neue paläarktische Borkenkäfer. V.** [Rare and new Palaearctic Bark-beetles. V.]—*Ent. Blätter*, xix, no. 3, pp. 133–139. Berlin, 30th September 1923. [Received 27th November 1923.]

The following new species are described: *Scolytus* (*Eccoptogaster*) *simmeli*, from *Ostrya carpinifolia* in Carniola; *Crypturgus corsicus* from Corsica; *Hylastes septentrionalis*, from spruce and pine, *Polygraphus griseus*, and *Dryocoetes suecicus*, all from Sweden; and *Taphrorychus minor* from Sardinia and Tuscany, in which latter region it was found in *Quercus ilex*. *Crypturgus mediterraneus*, Eichh., is considered a distinct species and not simply the male of *C. numidicus*, Ferr., as assumed by Reitter. *Ips heydeni*, Eichh., is simply the male of *I. acuminatus*, Gyll. *Minulus barbatus*, Eggers, which was described as a new genus and species from a museum specimen labelled Crete, cannot apparently have originated from the Old World, as *Minulus* proves to be a synonym of the Chilean genus *Cnemonyx*.

Riehm (E.). **Prüfung von Pflanzenschutzmitteln in den Jahren 1921-22.** [An Examination in 1921–1922 of Preparations for protecting Plants.]—*Mitt. Biol. Reichsanst. Land- u. Forstw.*, no. 24, 104 pp. Berlin, July 1923. [Received 30th November 1923.]

This paper summarises publications dealing with insecticides and fungicides that appeared in 1921 and 1922 [*R.A.E.*, A, ix, 398, 547].

Speyer (W.). **Kohlschotenrüssler** (*Ceutorrhynchus assimilis* **Payk.**), **Kohlschotenmücke** (*Dasyneura brassicae* **Winn.**) **und ihre Parasiten.** [The Pod Weevil, *C. assimilis*, and the Pod Midge, *Perrisia brassicae*, and their Parasites.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 3, pp. 79–108, 5 diagrams. Berlin, 1923.

The statistical methods already used at Naumburg for investigating the biology of crop pests [*R.A.E.*, A, ix, 547] have been retained in this investigation, which is described in detail.

The pod weevil, *Ceuthorrhynchus assimilis*, Payk., is a dangerous pest of rape; the salient points of its biology are in agreement with previous observations [*R.A.E.*, A, ix, 547, 605]. The Pteromalid, *Trichomalus fasciatus*, Thoms., may, perhaps, under favourable conditions, increase sufficiently to check *C. assimilis* in spite of the fact that only one generation parasitises the weevil, larvae being found in those of *C. assimilis* only during a fortnight in June. Measures against the weevil are necessary only if it is abundant or if the pod midge, *Perrisia* (*Dasyneura*) *brassicae*, is injurious. Such work must consist chiefly in mechanical collection.

Perrisia brassicae, Winn., is very dangerous to summer crops of Cruciferae, but only in cases where *C. assimilis* is present [*R.A.E.*, A, x, 262]. Threatened areas should be sown only with white mustard, and white charlock should not be permitted to grow. Natural control

is chiefly due to a Proctotrupid, *Platygaster* sp., and two Chalcids, *Pseudotorymus brassicae*, Ruschka, and *Tetrastichus brevicornis*, Thoms.—not three as previously stated [*loc. cit.*]. In August 1921 up to 68 per cent. of the midge larvae were parasitised by these Chalcids. The midge appears to have about 6 generations from May to October, but some larvae of the 3rd and later ones do not pupate till the following year. A certain percentage of the latter larvae escapes attack by the Chalcids, which cannot therefore be expected to stop an outbreak. While *T. brevicornis* appears at the same time as *Pseudotorymus brassicae*, it disappears in September—a month earlier—and probably has one generation less in a year, only 2 or at the most 3.

KAUFMANN (O.). **Beobachtungen und Versuche zur Frage der Ueberwinterung und Parasitierung von Oelfruchtschädlingen aus den Gattungen** *Meligethes, Phyllotreta, Psylliodes* **und** *Ceutorrhynchus.* [Observations and Experiments regarding the Hibernation and Parasitisation of Oil Crop Pests of the Genera *Meligethes, Phyllotreta, Psylliodes* and *Ceuthorrhynchus.*]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 3, pp. 109–169, 2 plates. Berlin, 1923.

This is a further contribution to a knowledge of the varying abundance of injurious insects [*R.A.E.*, A, ix, 547]. The information is given in very full detail, attention being chiefly directed to the adaptation to season and temperature of the life-history of the oil-crop pests, *Psylliodes chrysocephala*, L., and *Ceuthorrhynchus rübsaameni*, Kolbe (winter breeders); *C. pleurostigma*, Mrsh. (all-the-year-round breeder); *Meligethes aeneus*, F., *Phyllotreta nemorum*, L., *P. nigripes*, F., *P. undulata*, Kutsch., and *P. atra*, F. (of which *P. cruciferae*, Goeze, is regarded as a synonym) (summer breeders).

The conclusions reached are as follows:—At the present stage of knowledge it is inadvisable to combat summer breeders in their winter quarters, because these winter quarters harbour also the various parasites that exercise natural control on these pests. As a result of the prolonged hibernation of the summer breeders and all-the-year-round breeders collection is a useless measure if done only once, and as it is impossible in practice to carry out repeated catches in large acreages of oil crops, supplementary measures are necessary.

The possibility of taking advantage of the comparative phenology of the pests and their parasites is worthy of special attention as regards *M. aeneus* and its parasites, particularly *Diospilus oleraceus*. This Braconid appears in spring from the hibernated larvae of *C. pleurostigma* and *C. rübsaameni*. If its breeding in these weevils is encouraged it will be available against *M. aeneus* when the latter appears.

Hymenopterous parasites of the adult stage occur in all the beetles examined except *M. aeneus*. They are of practical value only as regards *Psylliodes chrysocephala* and *Phyllotreta atra*, restricting reproduction and killing the pest before much damage is done. The latter point is especially valuable in connection with *P. atra*. An artificial increase of the parasites is not feasible, as there are no alternative hosts as with *D. oleraceus*. In the case of *P. atra* the existence of hyperparasites in the adult stage presents an additional problem. Observations in the winter of 1921–1922 showed that a severe and prolonged winter is less important in decreasing pests than had been supposed. Such a winter is simply a link in a chain of circumstances favourable or unfavourable to an outbreak.

Priesner (H.). **Beiträge zur Morphologie der Jugendstadien der Thysanopteren (I).** [Contribution to the Morphology of the Early Stages of Thysanoptera.]—*Sitz. Akad. Wiss. Wien*, Abt. I, cxxxii, no. 1–3, pp. 1–18, 5 figs. Vienna, 1923.

The contents of this paper are indicated by its title.

Green (E. E.). **Note on** *Gossyparia mannifera*, **Hardw.**—*Ann. & Mag. Nat. Hist.*, xii, no. 72, pp. 697–698. London, December 1923.

Hardwick originally described *Chermes mannifer* from Persia; from his figures this species is distinctly not a Coccid, though in Fernald's "Catalogue" it is listed as *Gossyparia mannifera*, Hardw. Among the synonyms listed is *Coccus manniparus*, Ehrenb. The author considers that Hardwick's *Chermes mannifer* should be removed from the list of Coccids, and that *Coccus manniparus*, Ehrenb., should be regarded as a valid species and provisionally referred to the genus *Eriococcus*.

Buckell (E. R.). *Cyphoderris monstrosa* **Uhler in British Columbia (Orthoptera).**—*Canad. Ent.*, lv, no. 10, pp. 225–230. Orillia, Ont., October 1923.

Notes are given on the life-history in British Columbia of *Cyphoderris monstrosa*, Uhler. This species has been recorded as causing serious injury to the buds and flowers of cherry, peach, apple and pear trees in Idaho, but no similar damage has been reported from British Columbia.

Gibson (A.). **The Specific Name of the Green Bud-worm.**—*Canad. Ent.*, lv, no. 10, p. 243. Orillia, Ont., October 1923.

The Eucosmid previously identified as *Argyroploce consanguinana*, Wlsm. [*R.A.E.*, A, vii, 309] is now found to be *A. variegana*, Hb.

Matus (M. D.). **La lucha biológica contra el pulgón de los manzanos.** [Biological Measures against the Apple Aphis.]—*Gaceta Rural*, xvii, no. 195, pp. 229–235. Buenos Aires, October 1923.

This is an account of the employment of *Aphelinus mali*, Hald., against *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., in Argentina. Apples should be grafted on stocks resistant to the Aphid, so that the subterranean parts of the plants remain free from infestation, in order that the work of the parasite above ground may prove successful.

de Campos Novaes (J.). **A** *Prospaltella berlesei*, **How., Parasita da** *Diaspis pentagona*, **Targ.**—*Bol. Agric.*, xxiii, no. 11–12, pp. 343–366, 8 figs., 3 pls. S. Paulo, November-December 1922. [Received 26th November 1923.]

This article describes *Diaspis pentagona*, Targ., which occurs in Brazil, and its parasite, *Prospaltella berlesei*, How., which has been introduced and is now securely established.

Praga do caféeiro. [A Pest of Coffee.]—*Bol. Agric.*, xxiv, no. 1–2, pp. 9–10. S. Paulo, January-February 1923. [Received 26th November 1923.]

The Xylorictid moth, *Stenoma albella*, for many years known as a pest of the jaboticabeira [*Myricaria jaboticaba*], is now reported as attacking coffee. There is one generation a year. Treatment consists in strengthening the plants, in cutting off and burning infested branches, and in killing the borers in their holes by means of a pointed wire.

Praga do Café. [A Pest of Coffee.]—*Bol. Agric.*, xxiv, no. 3–4, pp. 83–88. S. Paulo, March-April 1923. [Received 26th November 1923.]

With reference to a report that *Araecerus fasciculatus*, DeG., has appeared in Colombia, it is stated that this beetle is a known pest of stored coffee beans in Brazil. It has proved less resistant than *Tenebrio* sp. to fumigation with a proprietary compound.

Bondar (G.). **Carunchos das amendoas de cacao.** [Cacao Bean Borers.]—*Correio-Agricola*, i, no. 9, pp. 227–230, 2 figs. Bahia, September 1923.

Stored cacao beans in Brazil are attacked by a moth and three species of beetles, a Nitidulid, *Carpophilus dimidiatus*, F., an Anthribid, *Araecerus fasciculatus*, DeG., and a Curculionid, *Spermologus rufus*, Boh.

The last named was found in cacao beans that had been stored in bags for about 4 months, and about 20 per cent. of them were unfit for use. In the laboratory the adults, which avoid light, lived for at least 3–4 months. They feed on the external pulp or on the cotyledons, to reach which they pierce the beans. Fresh beans or fermented and dried beans are accepted, but the pulp of fresh ones is preferred. The eggs are laid in the cavities of the cotyledons, and these serve as food for the larvae, of which three can develop in one bean. Pupation takes place inside the bean. The egg-stage lasts 5–8 days, the larval 50, and the pupal about 20. A brief description is given of the various stages.

Preventive measures consist in cleaning the stores after the disposal of each crop and in allowing birds and other natural enemies of the weevil free entrance. If an infestation is noticed carbon bisulphide should be used for fumigation.

Bondar (G.). **Formiga "Quem-quem," *Acromyrmex subterraneus*, For. Praga dos cacaoeiraes.** [The "Quem-quem" Ant, *A. subterraneus*, a Pest of Cacao Plantations.]—*Correio-Agricola*, i, no. 10, pp. 251–254, 2 figs. Bahia, October 1923.

Serious damage is done to cacao in Brazil by *Acromyrmex subterraneus* var. *brunneus*, For. This ant is not in fact subterranean, as it nests on the ground and cuts the leaves, flowers and bark of plants. The leaves are used for breeding a fungus. Digging up the nests or flooding them with petroleum or dilute creoline are the measures adopted, but they are not satisfactory. If reliable workers are available, the best method is to light a fire on the nest. The latter contains woody fragments that finally catch fire, and when the ants at length decide to abandon the nest it is too late to escape.

Bondar (G.). **Uma nova praga do caféeiro.** [A New Pest of Coffee.]—*Correio-Agricola*, i, no. 10, pp. 263–266, 2 figs. Bahia, October 1923.

One of the reasons for the decline of coffee growing in the Brazilian State of Bahia is the presence of Coccids such as *Coccus viridis*. In one plantation some 10,000 bushes have been severely attacked by a pest hitherto unrecorded from coffee, *Aleurothrixus floccosus*, Mask. *A.* (*Aleurodes*) *horridus*, Hemp., and *A.* (*Aleurodes*) *howardi*, Quaint., are considered to be synonyms of this species. This is a well-known pest of *Citrus*, and in Bahia it also occurs on Rubiaceae. It is possible that the present case represents an exceptional infestation under special and unusual conditions, but the planting of oranges among coffee is not advisable.

Wolcott (G. N.). **The Status of Entomology in Porto Rico.**—*Jl. Dept. Agric. & Lab. Porto Rico*, vi, no. 2, 11 pp. Rio Piedras, P.R., April 1922. [Received 3rd December 1923.]

A brief review is given of entomological work in Porto Rico since the establishment of the Federal Experiment Station at Mayaguez. The author deplores the fact that very few economic entomologists have stayed in the island long enough to do more than familiarise themselves with the problems that have to be faced there.

Besides the Porto Rican mole-cricket, *Scapteriscus vicinus*, Scudd. (changa), from which the plants are now protected by a ring of powder composed of 2–3 lb. Paris green to 100 lb. flour mixture, tobacco is damaged by the flea-beetles *Epitrix cucumeris*, Harr., *E. parvula*, F., and *Systena basalis*, Duv.; several cutworms, of which *Feltia annexa*, Treit., is the chief; the Sphingid, *Protoparce* (*Phlegethontius*) *sexta jamaicensis*, Butl., the Noctuid looper, *Syngrapha egena*, Guen., and the leaf-folder, *Pachyzancla periusalis*, Wlk., for all of which dusting with lead arsenate is recommended. The splitworm, *Phthorimaea operculella*, Z., is increasing in importance as a tobacco pest, having passed for a long time unrecognised; destruction of the larvae in the mines and the elimination of Solanaceous weeds and self-sown tobacco should do much to reduce the numbers.

With regard to *Diatraea saccharalis*, F., on sugar-cane, dead leaves and other rubbish should not be burnt in the field, as this destroys the egg-parasites, *Trichogramma minutum*, Riley, and *Prophanurus alecto*, Crawf., and infested seed should be planted, this being the easiest way of eliminating one source of infection for the young plant cane, as the moths cannot emerge from seed covered by 1 in. of soil. The introduction of *Tiphia* spp. for the control of *Lachnosterna* spp. (white grubs) had seemed to be a failure, but individuals have recently been found in the region where the colonies were released. Other sugar-cane pests include the weevils, *Diaprepes abbreviatus*, L. (*spengleri*, L.) and *Metamasius hemipterus*, L., *Strategus titanus*, F. (rhinoceros beetle), the mealybugs, *Pseudococcus sacchari*, Ckll., *P. calceolariae*, Mask., and *P. bromeliae*, Bch., the Aphid, *Sipha flava*, Forbes, etc.

Coffee is attacked by *Leucoptera coffeella*, Stn. (coffee leaf-miner) and a weevil, *Lachnopus coffeae*, Mshll., the adults of which feed on the tender leaves and buds and oviposit between the leaves, the larvae dropping to the ground and feeding on the roots. An ant, *Myrmelachista ambigua ramulorum*, For., tunnels in the trunks of coffee shade-trees,

and later attacks the coffee trees, on which it causes roughened thickenings where the branches come out, forming points of weakness at which the trees break when the berries are being picked. Cutting out and destroying old shade trees and replacing them by younger and perhaps other kinds of trees is effective but costly. Baits of powdered potassium or sodium cyanide and meat, or calcium cyanide applied with a dust-gun, are found to kill large numbers of the ants. The small yellow ant, *Wasmannia auropunctata*, Roger, is annoying to coffee pickers on account of its biting habits.

Alabama argillacea, Hb., was a serious pest of cotton for many years, but the parasites, *Chalcis inerta*, Cress., and *Sarcophaga sternodontis*, Towns., have lately kept it in check. The only leaf-feeding caterpillar found on cotton during the last few years has been *Anomis doctorium*, Dyar. *Eriophyes gossypii*, Banks (cotton leaf blister mite) is often found on tree cotton, but seldom does much damage in commercial fields. *Platyedra* (*Pectinophora*) *gossypiella*, Saund. (pink bollworm) is an important pest of cotton ; search is being made for the caterpillars in other food-plants, one having been found in a pod of okra [*Hibiscus esculentus*].

Wolcott (G. N.). **El Cucubano**, *Pyrophorus luminosus*, **Illiger.**—*Porto Rico Insular Expt. Sta., Rio Piedras, P.R.*, Circ. 80, 8 pp., 3 figs. San Juan, P.R., October 1923.

Pyrophorus luminosus, Ill., is of considerable benefit in Porto Rico, as it devours large numbers of white grubs (*Lachnosterna* spp.). It is sometimes suspected of damaging young tobacco plants, but this injury is far more likely to be caused by *Monocrepidius bifoveatus*, Beauv., and *Aeolus elegans*, F. The eggs of *P. luminosus* are laid in the soil in April and May, the larvae hatching in from 10 to 16 days and feeding chiefly upon insects found in the soil. Pupation occurs in the ground in the following year and lasts three weeks, the adults emerging from the ground and becoming active in the warm evenings of April and May. Development only occurs in moist ground, and therefore the insect is found chiefly in the part of the island where the rainfall is greatest.

The Pink Bollworm (*Pectinophora gossypiella*).—*Rept. Agric. Dept., Montserrat, 1921–22*, pp. 7–8. Barbados, 1923.

The first evidence in Montserrat of infestation by *Platyedra* (*Pectinophora*) *gossypiella* during 1921 was in July, but by the end of September a considerable area was more or less severely infested. The actual loss of cotton was not so serious as had been anticipated, and a comparatively large proportion of the second crop was reaped. Treatment of cotton seed by heat for planting purposes was again carried out.

Modification of Pink Bollworm Quarantine. Amendment No. 1 to 2nd Revision of Regulations Supplemental to Notice of Quarantine No. 52.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 8th October 1923.

These regulations regarding the interstate movement of cotton and cotton products directed against the pink bollworm [*Platyedra gossypiella*, Saund.], and effective as from 15th October 1923, are a revision of previous ones [*R.A.E.*, A, xi, 426].

SANBORN (C. E.). **Boll Weevil Life-history in connection with essential Methods of Control.**—*Oklahoma Agric. Expt. Sta.*, Circ. 50, 2 pp. [n.d.].

SANBORN (C. E.). **Suggestions relative to the Boll Weevil.**—*Oklahoma Agric. Expt. Sta.*, Circ. 53, 12 pp., 11 figs. Stillwater, Okla. [n.d.]. [Received 4th December 1923.]

The first of these papers briefly outlines the life-history of the boll-weevil, *Anthonomus grandis*, Boh., and the essential cultural methods for controlling this pest in Oklahoma.

The second paper is in part identical with the former, but gives additional information concerning the weather conditions favourable and unfavourable for the weevil, as well as a comparison between it and other weevils with which it might be confused.

The application of poison as advocated by the U.S. Bureau of Entomology [*R.A.E.*, A, viii, 457] is not recommended in Oklahoma until further experiments planned for 1922 prove this method to be satisfactory under existing conditions.

BRIGGS (G.). **Cotton Variety Tests.**—*Oklahoma Agric. Expt. Sta.*, Bull. 141, 15 pp. Stillwater, Okla., January 1923.

As a result of tests carried out from 1916 to 1922 with different varieties of cotton, those most suitable for localities in Oklahoma are recommended; and suggestions are given for selecting and growing cotton so as to minimise the injury done by the boll weevil [*Anthonomus grandis*]. The most suitable variety of cotton should be chosen first and then the type fixed. Under Oklahoma conditions a variety that produces a lint that is from 1 to $1\frac{1}{8}$ inches in length has most demand in the market; and it should be selected to give a type of medium-sized plant with a large number of short-jointed, continuous fruiting branches that begin coming off the plant near the ground, as this condition is associated with the ability to mature bolls early. It is believed that such a type may be obtained by judicious and continuous selection under Oklahoma conditions without causing any deterioration of the variety.

If the stalks are cut and ploughed in deeply about a month before the first heavy frosts in autumn, very few weevils will be able to survive the winter. Good seedbed preparation, early planting, and frequent shallow and late cultivation are also recommended.

HEADLEE (T. J.) & RUDOLFS (W.). **Some Principles which underlie the Making and Use of Nicotine Dust.**—*New Jersey Agric. Expt. Sta.*, Bull. 381, 47 pp., 18 figs. New Brunswick, N.J., January 1923. [Received 4th December 1923.]

In view of the results obtained with nicotine dust against *Macrosiphum solanifolii* [*R.A.E.*, A, x, 304], experiments have been undertaken in order to study the evolution of nicotine gas from various types of carrying substances. Under the conditions of these experiments great differences occur in the delivery of nicotine from different clay carriers impregnated with nicotine sulphate. The evolution of nicotine from mixed mineral carriers is superior to that from acid colloidal clay carriers. Pure crystalline carriers evolve more nicotine than colloidal carriers provided the particles of the crystalline carriers are not too

small. Nicotine delivery from all carriers becomes gradually less rapid. The evolution of nicotine is mainly dependent upon chemical reactions. Physical factors, such as surface tension, are also involved. Nicotine delivery responds to chemical " activators," carbonates ($CaCO_3$ plus $MgCO_3$) giving the best results. There exists a relation between free acidity and alkalinity of the carriers, as expressed in pH [hydrogen ion concentration] values, and the evolution of nicotine. Atmospheric moisture conditions influence nicotine delivery to a large extent (acceleration from carbonate carriers by certain amounts of atmospheric moisture, retardation from carriers without chemical activators). More nicotine is evolved under the influence of high temperatures than of low temperatures.

In the case also of impregnation with free nicotine the quantity of nicotine delivered differs with the different clay carriers. Less nicotine is evolved from colloidal carriers than from pure crystalline carriers, provided the particles of the latter are not below a certain size. The rapidity of nicotine evolution becomes gradually less from all carriers. No chemical reaction, but some physical factors are involved in the nicotine evolution. Nicotine delivery from different crystalline carriers, with and without chemical activators, is almost alike, compactness or structure of the carrier playing a rôle. An increase in atmospheric moisture retards nicotine delivery. Thus if the nicotine is drawn from sulphate sources it proves most effective in areas where the atmospheric moisture is comparatively high, but in the case of free nicotine, as no chemical action is necessary for its release, the best results are obtained when the application of the dust is followed by heat and dryness.

Magnesium limestone (dolomite) is an effective carrier for nicotine sulphate, is cheap, does not scorch plants and has good adhering qualities ; it makes a good dust for ground crops. A grade of dolomite that has from 85 to 95 per cent. of its bulk in the form of carbonates seems the cheapest and most effective agent, and as it is crystallinein character it meets the requirements outlined for rapid evolution of nicotine gas.

Hydrated lime with 10–30 per cent. dolomite impregnated with nicotine sulphate can be used with advantage for orchard dusting.

When nicotine evolution is generally recognised as a factor that defines the quality of nicotine dust, a standard method for measuring it will become necessary ; suggestions for a simple apparatus for this purpose are made.

The value of nicotine dust for destroying Aphids is measured by the number of pounds of nicotine gas that it will throw off within the 24–, 48– or 72– hour period following its application. All nicotine dusts to be used for killing Aphids should be guaranteed as to source of nicotine, nicotine content, and nicotine gas evolved under specified temperatures and moistures.

Field experiments with *Acyrthosiphon* (*Macrosiphum*) *pisi* indicate that a minimum of 50 pounds of a 1·5 per cent. free-nicotine dolomite dust should be used for one acre of infested peas where these are planted in solid rows 40 inches apart. Other dusts should be used in proportions that will give a similar evolution of nicotine gas to the above. In fields of denser growth the amount applied must be correspondingly increased. From 1 to 3 applications are recommended, depending on the length and severity of infestation, and they should begin when the Aphids do not exceed 50 to a 10 foot row.

The same instructions may be applied against *M. solanifolii* on potatoes, with a minimum dose of 30 lb. of 1·5 per cent. free-nicotine dolomite dust per acre where the plants are from 30 to 36 inches apart.

No satisfactory results were obtained with the dust against *Thrips tabaci* (onion thrips), and it was also relatively inefficient against *Myzus persicae* (peach aphis) on pepper plants.

Although the Aphids may be killed without their bodies coming in actual contact with the nicotine dust, its efficacy depends on whether the gas evolved becomes sufficiently dense in the atmosphere surrounding the breathing pores to effect their destruction.

The costs of nicotine dusts and sprays are compared. The greater cost of the dust is due to the manufacturing process involved in transforming the liquid nicotine into a dust. It should be remembered that under conditions in which the heavily infested leaves of the potato are resting on the ground, the dust proves more effective than the spray.

Fifth Annual Conference Western Plant Quarantine Board, Phœnix, Arizona, May 21 to 23, 1923.—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 6, pp. 235–313. Sacramento, Cal., June 1923.

At this Conference representatives described the situation with regard to quarantines existing in the various States and Hawaii, and in British Columbia and Lower California. Among the resolutions passed, one urged that the Federal Horticultural Board should adopt stringent measures in the enforcement of quarantine regulations at eastern ports, and that every effort should be made to strengthen the forces at eastern ports so as to guarantee adequate protection.

Webb (H. J.). **Investigation of Means of distributing Alfalfa Weevil.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 6, pp. 258–262. Sacramento, Cal., June 1923.

Suggestions are made for the modification and adaptation of existing inter-State quarantine regulations against the spread of the alfalfa weevil [*Hypera variabilis*] so that a uniform quarantine may be adopted. At present, thirteen States have quarantines against Utah on account of this weevil, and all of them are different.

Hunter (W. D.). U.S. Bur. Ent. **The Pink Bollworm Situation.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 6, pp. 287–294. Sacramento, Cal., June 1923.

A survey of the spread of the pink bollworm [*Platyedra gossypiella*, Saund.] is given, and in view of its possible establishment in California or Arizona, the advisability of considering legislation that would be adequate to deal with the situation when it arose is suggested.

Godfrey (G. H.). **The Alfalfa Stem Nematode** (*Tylenchus dipsaci*).—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 6, pp. 299–303. Sacramento, Cal., June 1923.

Tylenchus dipsaci (alfalfa stem nematode) is causing much damage locally to lucerne in Oregon and California, affected plants appearing yellow and dwarfed and dying out in patches. These plants can be pulled

up very readily as the stems are brittle. The pest is spread chiefly by means of irrigation water. It has also been demonstrated that the disease can be spread by hay from an infested field. Hay collected in the field in September and stored until the following February was found to be still infested with living nematodes. The only remedy is to plough up and destroy the infested areas, keeping all self-sown lucerne out of the field for a definite period—probably 3 years. As the farmers are very much opposed to quarantine measures, they are co-operating in these remedies and planting crops that do not attract the nematode. Cultivated and wild strawberries, the weed known as false dandelion and certain bulbs, particularly narcissus, have been recorded as food-plants in America.

FULMER (H. L.). **Insecticides and Fungicides.**—*Ontario Dept. Agric.*, Bull. 302, 48 pp., 1 chart, 1 fig. Agric. Coll., Guelph, Ont., September 1923.

A considerable amount of information on insecticides and fungicides is collected in this bulletin and presented in a convenient form. The insecticides are divided into food and contact poisons, and the substances used are described in detail with formulae and notes on their application. A guide to the employment of combined sprays and dusts is given, and spray calendars for fruit-trees and bush fruits in Ontario are appended.

CAESAR (L.). **The Control of the Codling Moth.**—*54th Ann. Rept. Fruit Growers' Assoc. Ontario 1922*, pp. 22–24. Toronto, 1923. [Received 4th December 1923.]

The codling moth [*Cydia pomonella*] is more difficult to control all over Ontario in some years than others, and it is the author's opinion that proximity to cold bodies of water is the determining factor in such seasons. The orchards situated near the Great Lakes suffered most in 1922. If this explanation is correct it would seem that in orchards under the influence of cold breezes from the lake the development of the codling moth is more retarded than that of the fruit. As a result, whereas the regular codling moth spray remained on the apples in orchards away from the lakes long enough to control the larvae, near the lakes the spray had nearly all disappeared from the fruit when the eggs hatched. Localities exposed to cold winds from the south of the lake should receive an extra application of spray 3 or 4 weeks after the regular one ; in some districts this would be about the end of June or early in July. If the weather is fine a spray of 1½ lb. powdered lead arsenate or 3 lb. paste to 40 gals. water is recommended ; in wet seasons Bordeaux mixture, at a strength of 2 lb. bluestone and 6 or 8 lb. hydrated lime to 40 gals. water, or lime-sulphur, 1 gal. to 50 or even 60 gals. water, may be used with the lead arsenate. In the discussion that followed the author said that in some districts second broods of the moth occur.

[**Australia.**] **Quarantine Regulations 1922.** Statutory Rules, No. 18, 58 pp. Melbourne, 1923.

These regulations repeal a large number of former ones and include all details as regards the quarantine of persons, animals and plants, etc., coming into Australia, with methods of disinfection and treatment.

Proclamations under the Quarantine Act 1908-1920 in force on the 31st December 1922. 20 pp. Melbourne, Department of Health [1923].

This is an abstract of the proclamations and quarantines in force that deal with diseases and pests of human beings, animals and plants.

McKeown (K. C.). **Fumigation of Citrus Trees.**—*Fruit World of Australasia*, xxiv, no. 8, p. 288–289. Melbourne, August 1923.

A new method of combating scale-insects on *Citrus* by fumigating with calcium cyanide [*cf. R.A.E.*, A, xi, 415], which was introduced by Mr. H. J. Quayle during a recent visit, is described. A tent or sheet is placed over the tree as in fumigating with potassium cyanide, but earth need not be placed on the skirt of the tent. The ground under the trees should be kept clear of weeds. The powdered calcium cyanide is applied by means of a small distributing machine. The one used in the tests was a small buffalo blower mounted behind a hopper, in which a brush revolved to keep the powder from clogging, and fitted with a small " gate " by means of which the feed can be cut off. From this extends a length of rubber hose. The whole is mounted on a pair of light wheels and can be drawn by hand from tree to tree. The calcium cyanide is weighed, and the necessary charge put in the hopper. The end of the hose is held under the skirt of the tent, and a few turns of the handle of the blower delivers the charge. The whole operation occupies only a few seconds. The tree should be exposed to the gas for 45 minutes. The quantity used for a tree is the same as with potassium cyanide, but no water or acid is used, the calcium cyanide liberating hydrocyanic acid gas on contact with the air. The advantages of this method over the old are that it is cheaper, the calcium cyanide costing 8d. a lb. against 1s. 7d.–1s. 9d. for potassium cyanide, giving for an average tree a cost of materials of 3d. as against 10d. in favour of calcium cyanide, and that there is no acid to burn the tents so that the fumigation equipment lasts longer. Fumigation must be stopped on the break of the season. Trees fumigated in dry weather showed complete control with full dosage and no injury to the tree ; with wet weather there was slight leaf drop, though not serious. Lemon trees were particularly susceptible to injury if fumigated in damp weather. Further experiment is necessary to prove if the method can be satisfactorily used in humid coastal districts, but even there in dry seasons it should be effective. It is, however, rather more restricted to favourable weather conditions than fumigation with potassium cyanide.

Tryon (H.). **Orange-tree Bug** (*Oncoscelis sulciventris*).—*Queensland Agric. Jl.*, xx, pt. 4, pp. 301–302. Brisbane, October 1923.

Further experiments with remedies against *Oncoscelis sulciventris* [*R.A.E.*, A, xi, 533] are described. The use of adhesive on the trunks of trees to prevent the insects ascending after having been shaken to the ground has proved successful, and co-operative action on these lines is advocated. Contact insecticides have also been tried, including lime-sulphur, nicotine sulphate, kerosene emulsion and resin-kerosene emulsion. The last-named was the only one that gave any results, destroying about 50 per cent. of the young insects. Fumigation tests with hydrocyanic acid gas resulted in bringing all the young bugs to the

ground, from 73 to 91 per cent. of these succumbing. It was noticed that these bugs, if picked up from the ground after fumigation and kept in receptacles, in most cases recovered. Their death on the ground would therefore seem to be due to exposure (probably to sun-heat).

CORBETT (G. H.). **Annual Report of the Government Entomologist [F.M.S. & S.S.] for 1922.**—*Malayan Agric. Jl.*, xi, no. 10, pp. 273–284. Kuala Lumpur, October 1923.

The principal pests of coconuts that were investigated in Malaya in 1922 were *Oryctes rhinoceros*, L., *Rhynchophorus schach*, Oliv., *Plesispa reichei*, Chap., *Batrachedra arenosella*, Wlk., and *Tirathaba* sp. near *trichogramma*, Meyr., and those of rice were *Leptocorisa varicornis*, F., *Podops coarctata*, F., and *Diatraea auricilia*, Dudgeon [*R.A.E.*, A, xi, 117, 189, 346, 389, 440, 532]. The maximum observed life of a female of *R. schach* was 116 days and that of a male 107. One female may lay as many as 832 eggs. The larvae can live and complete their life-cycle and the adults can emerge from logs buried more than 3 feet under the ground. Eggs are not laid in wood covered with an inch of sand. *Tirathaba* sp. deposits eggs on the opened flowers of the spike, generally where the buds overlap one another. Experimentally the life-cycle occupied 28–43 days. The larvae usually feed on the male flowers. Pupation occurs on the spike or spathe, or at the base of the spike where, owing to the fallen flowers collecting there, the larvae are able to reach maturity. Palms should be freed of all badly attacked spikes and all accumulated fallen flowers at the base of the spike. The larvae of *Erecthias flavistriata*, Wlsm., and *Pyroderces ptilodelta*, Meyr., feed on opened coconut spikes, but their economic importance has not yet been established.

The eggs of *Leptocorisa varicornis* hatch in 6–8 days, and are parasitised by a small Chalcid ; the nymphs and adults are attacked by a Reduviid. The eggs of *P. coarctata* are laid in groups at the base of the rice stems, but they may be deposited in the soil. They hatch in about 4 days. The minimum time for the nymphal stages is 29 days. This bug thrives best where there is stagnant water. A Chalcid parasitised 72·9 per cent. of the eggs, completing its life-cycle in 7 days.

A list is given of the pests of rubber and its products, though no important one was found in 1922. *Necrobia rufipes*, F. (red-legged ham beetle) was bred from egg to adult on copra, but is generally regarded as predacious. Eggs are laid in groups and hatch in 4 days ; the minimum time for the larval stage is 69 days and for the pupal 15. The adults are attracted to light traps. Fumigation of infested copra for 14 hours with hydrocyanic acid gas killed adults and larvae.

The larvae of *Prays citri*, Mill., were found feeding in the rind of limes, and after decay had resulted, the Nitidulid, *Carpophilus dimidiatus*, F., and larvae of *Drosophila lurida*, Wlk., were frequently seen. *Crocidomera robusta*, Moore, bores the fruit of various species of *Citrus*. *Cephonodes hylas*, L., deposits eggs singly on the tender leaves of coffee, chiefly on the upper side. These hatch in 3–4 days, the larvae maturing in 18–21 days, when they enter the soil. The pupal stage lasts 11–15 days. The pupae should be destroyed and trees sprayed with 2 lb. lead arsenate to 50 gals. water. The larvae of *Phragmataecia parvipunctus*, Hampn., bore in sugar-cane. Larvae of *Earias fabia*, Stoll, and *E. insulana*, Boisd., have been observed damaging cotton bolls. The

larvae of *Erionota thrax*, Moore, roll banana leaves. The eggs hatch in 5 days, the larval stage lasting 25 days and the pupal 10. The eggs are conspicuous on the leaves and should be collected, and all rolled leaves should be cut off. The larvae are often highly parasitised. *Epilachna indica*, Muls., is a pest of *Solanum melongena*, *Datura* and other related plants. Two local grasshopper outbreaks were recorded, *Valanga* (*Orthocanthacris*) *nigricornis*, Burm., having increased in one district, and *Cyrtacanthacris luteicornis*, Serv., being probably the species concerned in the other.

Bernès (J.). **Les Parasites de l'Olivier au Congrès oléicole de Nice.**—*Progrès agric. & vitic.*, lxxx, no. 47, pp. 518–524. Montpellier, 25th November 1923.

At the annual congress arranged by the National Society of Olive Cultivation of France, which met at Nice in October 1923, reports were submitted on the more important fungous and insect pests of olives. The latter include *Dacus oleae*, in connection with which two distinct lines of thought—biological control as opposed to the application of insecticides—were upheld. The details of these methods are described. It was agreed that further study on the subject should be given every encouragement and that pending the time when it might be found possible to attain complete success by the employment of parasites, the successful artificial remedial measures should be recommended and popularised. The resolutions passed at the Madrid Conference (1923) are appended [*R.A.E.*, A, xi, 548].

Delassus (—). **La Lutte contre le** *Dacus oleae* **ou Mouche de l'Olive. Au Congrès d'Oléiculture de Nice (14-19 October 1923).**—*Rev. agric. Afr. Nord*, xxi, no. 226, pp. 765–769. Algiers, 30th November 1923.

This is the first part of an account of the proceedings at the Congress referred to in the preceding paper.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, vii, no. 5, pp. 388–391. Pretoria, November 1923.

Living larvae and pupae of a moth borer, possibly of the maize and sugar-cane borer [*Diatraea saccharalis*], were intercepted in stems of broom corn imported from Argentina.

Heliothis (*Chloridea*) *obsoleta* has been recorded as attacking newly set oranges in various districts in South Africa; it is possible that the outbreaks are associated with certain crop combinations, and it is thought that cotton has suffered through being planted in land previously occupied by maize.

Swarms of locusts believed to be *Locusta migratoria* ph. *migratorioides* have been recorded from various districts governed by the Mozambique Company and also Southern Rhodesia. Numbers of *Locusta migratoria* ph. *danica* had been observed in Cape Province in 1921, and in Northern Rhodesia in 1917.

Leptoglossus membranaceus appears to be more than usually prevalent; it apparently feeds chiefly on veld vegetation, attacking *Citrus* fruit only during the dry winter season.

TRIBOLET (I.). **Olives.**—*Jl. Dept. Agric. Union S. Africa*, vii, no. 5, pp. 443–463, 14 figs. Pretoria, November 1923.

In this paper on the cultivation, pressing and pickling of olives one page is devoted to pests and diseases occurring in South Africa. These include *Dacus oleae* and a Tingid, *Teleonemia australis*. The latter, which is apparently indigenous to South Africa, sometimes almost defoliates the trees. Sprays of a soapy nature appear to be the most effective against it.

[**Northern Rhodesia.**] **Government Notice, 1923.** 1 p. typescript. [Received from Colonial Office, 7th December 1923.]

This notice under the Northern Rhodesia Cotton Proclamation, 1914, prohibits, as a safeguard against the introduction of pests, the importation of cotton seed or seed cotton into the part of Rhodesia formerly known as N.W. Rhodesia from the part formerly known as N.E. Rhodesia. Cotton seed or seed cotton may be introduced from N.W. Rhodesia into N.E. Rhodesia only under a permit from the Administrator.

SAGOT-LESAGE (M.). **Un Parasite de la Teigne de la Pomme de Terre.**—*Rev. hortic. Algérie*, xxvii, no. 10, pp. 215–216. Algiers, December 1923.

The successful establishment of *Habrobracon johanseni*, the Braconid parasite of *Phthorimaea operculella* [*cf. R.A.E.*, A, x, 393], is recorded in the district of Var in France, resulting in a marked decrease in the number of infested potatoes.

PAILLOT (A.). **Sur la variabilité du cycle évolutif d'un Ichneumonide, parasite nouveau des larves de** *Neurotoma nemoralis* **L.**—*C. R. Soc. Biol.*, lxxxix, no. 33, pp. 1045–1048. Paris, 1923.

The sawfly, *Neurotoma nemoralis*, L., which since 1918 has been found to cause a certain amount of damage to peach orchards in the Rhône valley, is parasitised by two Ichneumonids, *Holocremnus incrassator*, Holmg., and *Limnerium* (*Eulimneria*) *crassifemur*, Thoms., the latter being recorded for the first time from a Hymenopterous host. This change of host is accompanied by a modification of the life-cycle of the parasite, details of which are described. Whereas in *Pyrausta nubilalis*, Hb., one of the normal hosts of *L. crassifemur*, two generations a year occur, only one generation is recorded from *Neurotoma nemoralis*, but this appears earlier than, and pupates about the same time as, the second generation in *P. nubilalis*. The adults usually appear a few days before the emergence of the first adults of *Neurotoma*. The length of life of these adults of *L. crassifemur* is relatively limited and they are unable therefore to lay their full complement of eggs (300–400). This fact is probably to some extent

responsible for the slow increase of the parasite, another factor being the relative immunity of the sawfly larvae from the attack of these parasites. This immunity is due to some internal reaction in the host larva as a result of which the chorion of the parasitic egg becomes coated with a false membrane and is unable to develop. As many as 40 per cent. of the eggs are thus killed.

VAYSSIÈRE (P.). **Le Scolyte du grain de café** (*Stephanoderes coffeae*, **Hag.**).—*Agron. colon.*, nos. 70 & 71, pp. 107–112 & 136–150, 1 pl. Paris, October & November 1923.

A review is given of the literature concerning *Stephanoderes hampei*, Ferrari (*coffeae*, Hgd.), chiefly from Java, almost all of which has been noticed in this *Review*, and of the legislation passed to prevent its importation into French Colonies that are free from it [*R.A.E.*, A, x, 228].

WALTON (C. L.). **The Control of Aphides attacking Sprouting Potatoes.**—*Jl. Minist. Agric.*, xxx, no. 9, pp. 829–833. London, December 1923.

Experiments showed that *Myzus persicae*, Sulz., breeds rapidly throughout the winter on sprouting potatoes in storage under sheltered conditions. Tubers heavily infested with this Aphid were fumigated with paradichlorobenzene for 4 hours at 54–56° F., others were exposed to fumes of tetrachlorethane for 1 hour at 52–56° F., and others were treated with a dust containing 5 per cent. nicotine sulphate, equivalent to 2 per cent. pure nicotine. They were then planted, and examined about 8 weeks afterwards. The first two lots were markedly backward, while the lot treated with nicotine sulphate and the untreated lot were for the most part strong and vigorous. The yield, two months later, was relatively low, and this must be attributed to the results of Aphid attack, while the effects of the paradichlorobenzene and tetrachlorethane may possibly have been intensified by the previous severe Aphid injury. It might appear that although nicotine sulphate effectively killed the Aphids, the crop from the treated tubers was no better than from the untreated ones ; but both had been seriously weakened by Aphids, and had the dust been applied when the attack began in January instead of April, the results might have been very different. Sprouted potatoes should be treated as soon as they are seen to be infested, and potatoes intended for seed should be examined from time to time. The nicotine sulphate treatment would prove most effective on potatoes sprouted in boxes, etc., in single layers, as they are then freely exposed to the dust and a considerable quantity can be dealt with rapidly and effectively.

PHILLIPS (E. F.). **The Occurrence of Diseases of Adult Bees, II.**—*U.S. Dept. Agric.*, Dept. Circ. 287, 34 pp. Washington, D.C., November 1923.

As a sequel to his previous paper on Isle of Wight disease of bees [*R.A.E.*, A, x, 406] the author has compiled this summary of the reports that have come to the attention of the United States Bureau of Entomology regarding its distribution throughout the world. In an appendix is given the legislation that has been passed in the United States regarding the importation of adult honey-bees.

FENTON (F. A.) & HARTZELL (A.). **Bionomics and Control of the Potato Leafhopper** *Empoasca mali* **Le Baron.**—*Iowa Agric. Expt. Sta.*, Research Bull. 78, pp. 379–440, 4 pls., 19 figs. Ames, Iowa, July 1923. [Received 10th December 1923.]

Empoasca mali is the most serious insect pest attacking potatoes in Iowa and probably in the Mississippi valley. A detailed account is given of its life-history [*R.A.E.*, A, ix, 31, 246]. It has comparatively few natural enemies, and none of them is of sufficient importance to be depended on for control. It is preyed upon by an ant, *Lasius brunneus*, an Anthocorid, *Triphleps insidiosus*, a Chrysopid, *Chrysopa plorabunda*, and a Coccinellid, *Hippodamia tredecimpunctata*. The most effective natural enemy is *Anagrus armatus*, which occurred in considerable numbers in July and August 1919 and again in 1922, parasitising as many as 40 per cent. of the eggs.

During 1919 a fungous disease of the leafhopper, *Entomophthora sphaerosperma*, was common throughout the State.

The aetiology and nature of hopperburn, its artificial production, and the influence of climate, soil and cultural factors upon its development are discussed [*cf. R.A.E.*, A, ix, 247; x, 532]. The date of planting appears to have a decided influence on the development of hopperburn, owing to the fact that female leafhoppers prefer partly grown potato plants for oviposition and are not attracted to the smaller ones that develop from tubers planted later. Certain varieties of potatoes appear to suffer more than others, the relative freedom from the disease depending on comparatively slow and continuous growth coupled with abundance of leaf surface.

Spraying tests conducted during the last four years are described and the results shown in tables. The combination of whale-oil soap and nicotine sulphate [*R.A.E.*, A, x, 533] proved very unsatisfactory. It killed 60 to 70 per cent. of the nymphs, but did not affect many of the adults, nor had it any action on the numbers of young that hatched within the next 24 hours, while sufficient of the older nymphs survived to continue the production of hopperburn. The same difficulty occurred with kerosene emulsion, and there was also the possibility of scorching the foliage as severely as the hopperburn would do. Bordeaux mixture (4 : 4 : 50) in 3 applications gave good results [*R.A.E.*, A, x, 532; xi, 414]. If applied properly during June or July at intervals of 10 to 14 days under favourable conditions, the thin film of spray remained on the plants for some time, and many newly hatched nymphs died through eating the sprayed leaves, while ovipositing females were repelled by them. Nicotine sulphate apparently added nothing to the effectiveness of the spray. Commercial brands of Bordeaux mixture were generally reliable, but were more expensive and washed off under heavy rain. A bibliography of 65 titles is appended.

ZACHER (F.). **Beiträge zur Kenntnis der Vorratsschädlinge.** [Contributions to a Knowledge of Pests of Stored Products.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 4, pp. 171–177, 1 pl. Berlin, 1923.

This title covers the four papers noticed in the following pages. A foreword briefly discusses the various pests of stored food-stuffs in Germany and the losses caused. It is intended in this series of papers to leave pests of clothing, etc., for later treatment.

Zacher (F.) & Janisch (E.). **Untersuchungen über den Schädlingsbefall des Auslandsgetreides.** [Researches on the Infestation of Foreign Grain.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 4, pp. 178-233, 1 pl. Berlin, 1923.

This is a detailed report on a government investigation in Germany on the pests infesting imported grain.

The findings were obtained during a period of about 2 years beginning April 1921, and are based on some 300 samples of grains. The latter were analysed firstly according to the degree of infestation present, and secondly according to the biological types of species, *i.e.* those feeding on sound grains (primary feeders), on broken or already infested grains, on grain débris and flour, etc., on moulds and fungi, those that are predacious, and parasites. The complete list includes 167 species.

The results attained in these investigations and in those made abroad lead to the following conclusions :—Notable differences occur in the amount of infestation of foreign grains. An analysis of infestation should include examination of the débris from cleaning processes. Grain with an infestation of 5,000 primary feeders per hectolitre (about $2\frac{3}{4}$ bushels) (medium infestation) should not be kept long in storage, or—if such storage is unavoidable—the grain must be disinfected, heat providing the best method for doing so. The débris from cleaning should be immediately disinfected, and store-houses should be carefully cleaned before being filled again. Besides the primary feeders, the secondary feeders are of considerable economic importance, and as they migrate to flour, chaff, etc., they are carried into shops and dwellings. As the moisture content of stored grain is a decisive factor in the development of pests, the grain should be stored in as dry a condition as possible. A moisture content of 12–13 per cent. is the minimum for beetles (*Calandra*) and 11–12 per cent. for mites, *Tyroglyphus* (*Aleurobius*). The second decisive factor is temperature. In summer the temperature in Germany may permit the development of tropical species, which then perish in winter in unheated rooms. In warehouses for the bulk storage of grain the winter temperature is usually too low to permit the development of insects and mites, but not sufficiently low to kill them. In steam mills most insects can develop without hindrance through the winter. Most insects and mites in all stages are killed by heating at 60° C. [140° F.] and in general it is sufficient to heat the grain for some hours to 52–54°C.[125·6–129·2°F.]. Where it is intended to store reserve supplies for long periods, the grain must be kept free from infestation and as dry as possible. If, however, grain must be stored irrespective of its condition, it is necessary that cold storage at a temperature under 6° C. [42·8° F.] be used, or dry storage, or storage in airtight containers. The method to be employed should be selected by an expert for the case concerned.

Schmidt (M.). **Die morphologischen Unterschiede von** *Calandra oryzae* **L. und** *Calandra zea-mais* **Motsch.** (*platensis* **Zacher**). [The morphological Differences between *C. oryzae* and *C. zea-mais*.] —*Arb. Biol. Reichsanst. Land-u. Forstw.*, xii, no. 4, pp. 233–235, 4 figs. Berlin, 1923.

Besides *Calandra granaria*, L., and *C. oryzae*, L., Zacher in 1922 found a third form —chiefly in maize from the River Plate —which he named *C. oryzae* var. *platensis*. This has been found to be identical with *C. zea-mais*, Motsch. The characters differentiating the latter from *C. oryzae*, L., are given.

(K251) Wt. P.12/D.4 1,500 2/24 H & Sp Gp 52

ZACHER (F.). **Wanzen im Auslandsgetreide.** [Bugs in Foreign Grain.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 4, pp. 236–242, 3 figs. Berlin, 1923.

In 1920 the author found an Anthocorid bug in a cargo of grain from the River Plate and describes it here as *Triphleps frumenti*, sp. n. In 1921 the same species was found in a warehouse near grain from the River Plate. Apparently the only other record of bugs in grain was made by Willcocks, who found *T. madeirensis*, Reut., in Egypt in 1922 in grain infested with beetles, Psocids and mites. *T. frumenti* may be useful as a destroyer of grain pests, but it is doubtful whether the bug can decrease their numbers to any material extent.

JANISCH (E.). **Zur Bekämpfungsbiologie des Brotkäfers,** *Sitodrepa panicea* **L.** [A Contribution to the Biology of *S. panicea* as affecting Control.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 4, pp. 243-284, 1 pl. Berlin, 1923.

This study was undertaken in view of the serious losses in food-stuffs caused by *Sitodrepa panicea*, L., in Germany during the War.

The first portion of the paper reviews existing literature on this Anobiid, its classification, distribution and parasites, and the injury it causes. The second is a detailed morphological and biological study of all the stages from egg to adult. The complete life-cycle appears to require about 7 months even in buildings heated up to about 22° C. [71·6° F.]. A table is given of the morphological differences in adults of different ages in view of the differences in their behaviour. The older the adult the more the edges of the elytra cover the sides of the abdomen owing to the decrease in the size of the latter.

It was shown in these experiments that infestation by flight does not occur. The spread of the species is effected by crawling adults and by young larvae. The original infestation is due to the introduction of infested material. Mechanical measures against *S. panicea* must be based on the following points: The beetles with covered abdomens, which are the ones usually seen crawling or flying in stores or are taken in light traps, are old individuals incapable of depositing eggs, but useful as the indicators of infestation. Ovipositing females are usually limited to the focus of infestation. Secondary infestation is due to the females seeking other places in which to deposit eggs owing to overcrowding, or loose condition or disturbance of the infested material. The newly hatched larvae are very susceptible to draughts and seek to avoid them. In cool places such as larders there is usually only one generation a year. In places heated in winter two generations may be expected; at 27° C. [80·6° F.] development takes about two months.

Regular inspection of supplies is necessary, usually twice a year, at the beginning or the end of winter and again in July. Infestation is revealed by the round exit-holes, heaps of larval excreta, loam-like masses of beetle excreta, the presence of pupae and larvae, and pupae attached to the inner sides of bags or boxes. Examination of the windows or of fly-papers hung near windows or lamps left lit at night will record the presence of adults. Control measures include disinfestation or burning of infested material, even if only slightly attacked; the provision of a draught of air in all cases where the occurrence of wandering young larvae is probable; and repeated re-inspection. Disinfestation must be carried out immediately, as mature females may be caused to oviposit elsewhere as a

result of the disturbance of their usual breeding place. The material should be heated at 60–80° C. [140–176° F.] for several hours. Very severely infested food that may still be utilised as poultry food should be treated immediately by pouring boiling water over it.

Saalas (U.). **Die Fichtenkäfer Finnlands. Studien über die Entwicklungsstadien, Lebensweise und geographische Verbreitung der an *Picea excelsa*, Link., lebenden Coleopteren nebst einer Larvenbestimmungstabelle. II. Spezieller Teil 2 und Larvenbestimmungstabelle.** [The Spruce Beetles of Finland. Studies of the Developmental Stages, Life-history and Distribution of the Coleoptera living on *Picea excelsa*, Link., with a Key to the Larvae. II. Specific Part 2 and Key to the Larvae.]—*Ann. Acad. Scientiarum Fennicae*, Ser. A, xxii, no. 1, x + 746 pp., 28 pls. Helsingfors, 1923.

The first volume of this work has already been noticed [*R.A.E.*, A, vii, 272]. This second volume contains the second part of the section dealing with the species and keys for identifying the family and species of the larvae. Owing to new records since the first volume the total number of species has been increased from 341 to 367, and those actually observed on spruce, from 289 to 311. A few misidentifications are corrected. A supplementary bibliographical list and a name-index complete the volume.

Izquierdo S (V.). **Nota sobre el huevo de *Eriocampoides limacina* ("Chape").** [A Note on the Egg of *E. limacina*.]—*Rev. Chil. Hist. nat.*, xxv (1921), pp. 120–123, 1 fig. Santiago de Chile, 1923.

The available information on the oviposition of *Eriocampoides limacina* is contradictory. In Chile the egg is laid beneath the epidermis of the upper leaf-surface, which is left intact, through a hole bored in the lower surface.

Brèthes (J.). **Catalogue synonymique des Coccinellides du Chili.**—*Rev. Chil. Hist. nat.*, xxv (1921), pp. 453–456, 1 fig. Santiago de Chile, 1923.

The title of this paper indicates its contents. For the Chilean species of *Oryssomus* the author erects a new genus, *Cranoryssus*, between *Oryssomus* and *Cranophorus*.

Porter (C. E.). **Notas breves sobre Longicornios chilenos.** [Brief Notes on Chilean Longicorns.]—*Rev. Chil. Hist. nat.*, xxv (1921), pp. 495–501, 2 figs. Santiago de Chile, 1923.

The Longicorn beetles mentioned include *Compsa livida*, recorded as destroying an avenue of *Araucaria*.

Baker (A. C.) & Moles (M. L.). U.S. Bur. Ent. **The Aleyrodidae of South America with Descriptions of four New Chilean Species.**—*Rev. Chil. Hist. nat.*, xxv (1921), pp. 609–648, 1 fig., 9 pls. Santiago de Chile, 1923.

This handbook on the Aleurodids of South America contains a short general account of the family and keys to the genera. The new

species are *Aleurodicus pigeanus* from *Quillaja saponaria, Dialeurodes natickis* from *Eugenia luma, Trialeurodes unadutus* from *Drimys winteri,* and *T. shawundus.*

Brèthes (J.). **Nouveaux Hymenoptères parasites du Chili.**—*Anales Zool. aplic.*, viii, pp. 6–8. Santiago de Chile, 1921. [Received 4th December 1923.]

The new species described include *Bothriothorax silvai* parasitising a Syrphid.

Porter (C. E.). **Notas breves de Entomología agrícola.** [Brief Notes regarding Agricultural Entomology.]—*Anales Zool. aplic.*, viii, pp. 20–21. Santiago de Chile, 1921. [Received 4th December 1923.]

The foliage of the avocado [*Persea gratissima*] is attacked by the caterpillar of *Thanatopsyche chilensis,* Phil. *Oecophora candidella,* Bl., attacks *Convolvulus arvensis* and the leaves of sweet potato (*Ipomoea batatas*).

Cobb (N. A.). **Two Tree-infesting Nemas of the genus** *Tylenchus.*—*Anales Zool. aplic.*, ix, pp. 27–35, 3 figs. Santiago de Chile, 1922. [Received 4th December 1923.]

Descriptions are given of *Tylenchus arboricolus,* sp.n., from the leaves of *Fagus obliqua* in Chile, and *T. durus,* sp.n., from galls in the cortex of chestnut oak (*Quercus primus*) in Virginia, U.S.A.

Porter (C. E.). **Notas breves de Entomología agrícola.**—*Anales Zool. aplic.*, ix, pp. 36–37. Santiago de Chile, 1922. [Received 4th December 1923.]

A mite, *Rhizoglyphus hyacinthi,* was found on the tubers of potatoes (*Solanum tuberosum*), and potato foliage was attacked by a bug, *Capsus picturatus. Syrphus similis* was observed destroying the woolly aphis, *Eriosoma lanigerum.*

Quintanilla (R.). **El escarabajo rayado del pepino** (*Diabrotica vittata*). [The Striped Cucumber Beetle.]—*Agricultor Mexicano,* xxxix, no. 11, p. 324. C. Juarez, Chih., Mexico, November 1923.

Against *Diabrotica vittata* on cucumbers and melons dusting with a mixture of 6 parts by weight nicotine sulphate and 94 parts slaked lime is advised. If desired, an addition of 10 per cent. of lead arsenate may be made. About 1 lb. of dust is needed for 200–300 plants.

Grandi (G.). **Imenotteri dei fichi della fauna olartica e indo-malese.** [The Hymenoptera of Figs of the Holarctic and Indo-malayan Fauna.]—*Ann. Mus. Civico Storia Nat.*, li, pp. 101–108. Genoa, 1923.

This is a preliminary description of the following new Hymenoptera from figs :—Agaoninae : *Blastophaga ishiiana* from *Ficus wightiana*

from Japan ; *Waterstoniella fiorii*, *Ceratosolen megarhopalus*, and *C. elisabethae* from Sumatra. SYCOPHAGINAE : *Eujacobsonia mirabilis*, gen. et sp. n., from Sumatra. IDARNINAE : *Neosycophila omeomorpha*, gen. et sp. n., from *Ficus gibbosa* from Sumatra. All except the first and last named were taken at light.

GRANDI (G.). *Neosycophila omeomorpha* **Grnd. e sua importanza biologica. (16° Contributo alla conoscenza degli Insetti dei Fichi.)** [*N. omeomorpha*, Grnd., and its Biological Importance. (16th Contribution to the Knowledge of Fig Insects.)]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric.*, xvii, pp. 108–130, 9 figs. Portici, 1923.

This is a detailed description of the morphology and biology of *Neosycophila omeomorpha*, recorded in the preceding paper. This Chalcid was associated with other insects in *Ficus ampelas*, but was found alone in *F. gibbosa*.

LEHMANN (H.). **Die Arsenfrage.** [The Question of Arsenicals.]—*Schweiz. Obst- u. Gartenbau-Ztg., 1923*, no. 19, pp. 320–322. Münsingen, October 1923.

The results from numerous experiments to determine the residual quantities of arsenic after spraying are tabulated, and the conclusion reached is that no fear need be entertained of poisoning from this cause.

GAHAN (A. B.). **On the Identity of a European Chalcidoid Parasite of the Alfalfa Leaf-weevil.**—*Jl. Washington Acad. Sci.*, xiii, no. 18, pp. 408-411. Baltimore, Md., 4th November 1923.

The new species described, *Peridesmia phytonomi* (possibly a synonym of *P. aquisgranensis*, Mayr), is one of those parasites which are being introduced into the western United States to combat the alfalfa weevil *Hypera variabilis*, Hbst. (*postica*, Gyll.). The larva is said to feed externally on the egg-masses of the weevil.

MCCLINTOCK (J. A.). **The Transmission of Nematode Resistance in the Peach.**—*Science*, lviii, no. 1510, pp. 466–467. Garrison, N.Y., 7th December 1923.

In the spring of 1919 peach seedlings from pits obtained from three different sources were planted in soil infested with the root-knot nematode [*Heterodera radicicola*] at the Georgia Experiment Station. During the summer it was observed that a lot of seedlings from Florida were growing more vigorously than those from Georgia, and in the autumn the former were practically free from root-knot, while the latter were heavily infested. The resistant seedlings were reset in infested soil where they continued to make a vigorous growth during 1920. The seed from these seedlings on being tested in infested soil in 1922 was found to have retained the resistant property. Further experiments are being carried out.

Larrimer (W. H.). **Army Worm Control through County Organisation.**—*Proc. Indiana Acad. Sci. 1921*, pp. 261–263. Indianapolis, 1922.

A very general outbreak of the army worm, *Cirphis unipuncta*, Haw., occurred throughout the Central United States during the late spring and early summer of 1919. Under the organisation of the county agents, mass meetings were held and brief facts concerning the life-history and control of the pest were given to the farmers by a representative of the U.S. Bureau of Entomology. As a result, the outbreak was successfully controlled [*cf. R.A.E.*, A, ix, 111].

Weiss (H. B.). **The Chinese Mantis, a beneficial Insect in New Jersey, *Paratenodera sinensis*, Sauss.**—*New Jersey Dept. Agric., Bur. Stat. & Inspec.*, Circ. 68, 8 pp., 4 figs. Trenton, N.J., October 1923.

Several attempts have been made to establish species of Mantids in New Jersey, and they now seem to have attained a very strong foothold in the southern and eastern parts of the State. Two species have been recorded, *Stagmomantis carolina*, Johann, and *Paratenodera sinensis*, Sauss. A key is given for the identification of these two species and also of *Mantis religiosa*, which is already established in New York State and will probably appear sooner or later in New Jersey. They feed on almost any kind of insect. *P. sinensis* passes the winter in the egg stage in nests or egg-cases, which may be seen firmly attached to bushes, or to the branches of small trees. Hatching occurs in June, and the insects become mature in late September or early October.

Beckwith (C. S.). **Cranberry Growing in New Jersey.**—*New Jersey Agric. Expt. Sta.*, Circ. 144, 39 pp., 27 figs. New Brunswick, N.J., December 1922. [Received 17th December 1923.]

The information in this paper regarding cranberry insects and remedies against them is taken from one previously noticed [*R.A.E.*, A, vi, 561]. A chart is given showing the life-cycles of the chief cranberry pests and the correct times for flooding the bogs.

Headlee (T. J.), Martin (W. H.) & Farley (A. J.). **Spray Calendars.**—*New Jersey Agric. Expt. Sta.*, Circs. 147, 149, 150, 151 ; 4, 4, 4, 3 pp., 1, 3, 1, 1 figs. New Brunswick, N.J., 1st February 1923. [Received 17th December 1923.]

These revised spray calendars suggest the best time and materials for spraying apples and quinces, pears, plums and cherries, and grapes under New Jersey conditions.

Peterson (A.). **Para-dichlorobenzene (p-c-benzene) for controlling the Peach-tree Borer.**—*New Jersey Agric. Expt. Sta.*, Circ. 156, 12 pp., 8 figs. New Brunswick, N.J., September 1923.

This is a revision of a previous circular [*R.A.E.*, A, xi, 17]. The latest observations lead to the conclusion that while "worming" is a successful remedy for peach-tree borer [*Aegeria exitiosa*, Say] in trees of all ages, paradichlorobenzene should only be used on trees of

3 years or older, or, in the case of greenhouse trees, of 6 years or more. Plum and cherry trees should not be treated under the age of 6 years. Paradichlorobenzene should not be used on apple trees or blackberry bushes.

PETERSON (A.). **The Pepper Maggot, a new Pest of Peppers and Egg-plants,** *Spilographa electa*, **Say** (**Trypetidae**).—*New Jersey Agric. Expt. Sta.*, Bull. 373, 23 pp., 3 pls. New Brunswick, N.J., January 1923. [Received 17th December 1923.]

Spilographa electa, Say, which has hitherto been known only as a pest of the horse nettle, *Solanum carolinense*, has during the last two years become a serious pest of *Capsicum annuum* (pepper plant) and *Solanum melongena* (egg-plant). The area devoted to pepper-growing in New Jersey is over 5,000 acres, and infestation by this pest is rapidly increasing. The pepper fruits begin to be attacked when they are about ½ to 1½ inches in diameter, the female puncturing the wall of the fruit and laying the egg within. In about 10 days the eggs hatch, and the larvae make their way to the core of the fruit, where they feed and develop. By the time they are fully grown (in about 18 days) the central core is partly or completely destroyed, and the fruit often drops from the plant. The larva then makes an exit hole and pupates in the ground, 1 or 2 inches below the surface. The average duration of the larval stage was 18 days, and the maximum number of larvae was seen in late August and early September. The adults are present in the fields from 8th July to 23rd August. Apparently there is only one generation in a year. No remedies have been found for this pest. The adults will drink water, sugar and water or molasses and water, but they show no great preference for the solutions, and if a little sodium arsenite is added, they do not seem to be affected by the poison. If *S. electa* extends its range of food-plants among the Solanaceae it may become a pest of primary importance.

PETERSON (A.). **The Blackberry Psyllid,** *Trioza tripunctata*, **Fitch.**—*New Jersey Agric. Expt. Sta.*, Bull. 378, 32 pp., 33 figs. New Brunswick, N.J., February 1923. [Received 17th December 1923.]

Trioza tripunctata has for some years been a troublesome pest on blackberries in the south of New Jersey, apparently occurring only on bushes growing near conifers. The adults hibernate on the needles of spruce, pine and cedar trees, but do not seem to injure them. In late May or early June all the adult females migrate to blackberry bushes, the majority going to the cultivated variety, where they feed on the new shoots, causing the new canes and leaves to become curled, stunted and dark in colour. This injury continues to increase throughout the season. Oviposition occurs on the injured part of the plant during June and early July ; the eggs hatch in about 10 days and the nymphs live on the inner side of the curled leaves and shoots. Early in October they become adult and all the females and about half the males migrate to conifers. There is therefore one generation in a year. The stages of the insect are described and figured. Spiders and the larvae of an unidentified Syrphid, which feed on the nymphs, are the only natural enemies that have been observed.

A successful remedy is to spray with 1½ U.S. pints nicotine sulphate and 4 lb. fish-oil soap to 100 U.S. gals. water after the females have migrated to the blackberry bushes, and before they have laid their eggs. Two or three applications are necessary. Nicotine dust is less satisfactory. All infested shoots should be cut off and destroyed early in June after migration has occurred. To reduce infestation in the next season, growers should co-operate in pruning the infested canes between 10th June and 1st September.

FARLEY (A. J.). **Dry-mix Sulphur Lime.**—*New Jersey Agric. Expt. Sta.*, Bull. 379, 16 pp., 2 figs. New Brunswick, N.J., 1st February 1923. [Received 17th December 1923.]

The formula recommended for 50 U.S. gals. of this spray mixture is 8 lb. superfine sulphur, 4 lb. hydrated lime and ½ lb. calcium caseinate. It has the following advantages over lime-sulphur and other common sulphur fungicides :—It is much easier to prepare and apply ; it can be mixed well in advance of the spraying season ; it can be thoroughly applied without danger to fruit or foliage ; it is much cheaper than any satisfactory commercial preparation now on the market ; and it spreads better. Lead arsenate at the rate of 1½ lb. to 50 U.S. gals. can be used with this mixture.

FLEMING (W. E.). **Fumigation of Potting Soil with Carbon Bisulfide for the Control of the Japanese Beetle** (*Popillia japonica*, **Newm.**).—*New Jersey Agric. Expt. Sta.*, Bull. 380, 45 pp., 18 tables, 7 figs. New Brunswick, N.J., January 1923. [Received 17th December 1923.]

The results of these experiments with carbon bisulphide as a soil fumigant against *Popillia japonica*, Newm. (Japanese beetle) [*cf. R. A. E.*, A, x, 88] show this to be a cheap and efficient material for use in the case of potting soils [*R. A. E.*, A, xi, 260]. The chemical study of the diffusion of carbon bisulphide vapour in the soil is discussed. Concentration of the gas varies inversely with the distance laterally from the injection hole. Maximum concentration is attained sooner, and disappears more rapidly from the layers of the soil relatively near the surface, as the gas sinks through the soil. Lateral diffusion has been said to vary directly with the atmospheric temperatures, but is independent, generally speaking, of the atmospheric pressure. Wet soil should not be treated ; diffusion varies inversely with the soil moisture. [*Cf. R. A. E.*, A, xi, 222.]

The soil takes up and absorbs a considerable amount of the initial carbon bisulphide charge, after which it removes little from the soil air. Treating the soil a second time greatly increases the persistence of the vapours in it.

Treating soil in a heap above the surface of the ground does not give complete control ; and when above ground, fumigation boxes should be air-tight. A covered pit makes an efficient fumigation box.

In general, carbon bisulphide tends to stimulate subsequent plant growth, but at the strength used against *P. japonica* it has little or no effect in this connection.

MARTIN (W. H.). **Ten Years of Potato Spraying in New Jersey.**— *New Jersey Agric. Expt. Sta.*, Bull. 383, 32 pp., 25 tables. New Brunswick, N.J., April 1923. [Received 17th December 1923.]

Potato spraying experiments have been conducted for the past ten years in New Jersey and the results here summarised have been taken from the annual reports of the Experiment Station for the years 1913–1922. In addition to the increased yields, the results indicate that tubers from sprayed plants are more vigorous than those from unsprayed ones. A 5–5–50 Bordeaux mixture appears to be the most satisfactory spray. Besides being a fungicide, it acts as a repellent for insects, and is particularly effective against potato leaf-hopper [*Empoasca mali*]. The first application should be made when the plants are 8–10 in. high and the subsequent applications at 10 to 14 day intervals.

COOK (W. C.). **Studies in the Physical Ecology of the Noctuidae.**— *Minnesota Agric. Expt. Sta.*, Tech. Bull. 12, 38 pp., 14 tables. Univ. Farm, St. Paul, Minn., March 1923. [Received 17th December 1923.]

An attempt has been made to determine the effects of the various meteorological factors on the distribution, seasonal abundance and activity of certain Noctuids. Very few species have as yet been studied in this connection, but results of fundamental importance have already been obtained, and the methods used are applicable to the solution of many similar economic problems. Attention has largely been concentrated on *Cirphis unipuncta*, *Porosagrotis orthogonia* and *Lycophotia margaritosa*, and the results of the investigations described demonstrate that each of these species has a definite optimum and limiting soil moisture requirement, which has been ascertained directly by laboratory experiments in the case of *L. margaritosa*, and indirectly by a study of conditions related to outbreaks in the case of the other two. The moisture requirement can be expressed mathematically in the form of an equation similar to that expressing the relation of vapour pressure of water to temperature, giving directly the optimum condition in terms of temperature and precipitation during the growth period of the species. The soil moisture curves may be used to indicate the distribution of each species by plotting the mean data for the conditions of any Station on the same graph and comparing their location with the curve. In each case the optimum moisture requirement of the species occurring in any given region is a close approach to the normal climatic condition in that region, so that outbreaks would occur in every season were it not that there are also certain sequences of climatic conditions necessary for the production of the species in large numbers, which must be fulfilled in any season before an outbreak can occur. They may operate either by favouring the pest, by limiting the activities of its enemies, or both, and are the controlling factor in the production of outbreaks, and a careful study of such a sequence in the life-history of any insect should render possible the prediction of an outbreak in any given region. The conditions of hibernation seem to be of the greatest importance in this respect, and an outbreak is apparently directly related to the percentage of larvae that survive the winter successfully.

The author emphasises the importance of using mathematical methods in the study of insect outbreaks, and as the literature of statistics is rather foreign to entomologists, a few titles of works that are particularly helpful in such a study are listed in the bibliography.

WARREN (D. C.). **Results of Cotton Dusting Experiments for 1921, together with Summary of the Dusting Results for past Three Years.**

WILLIAMS (I. W.). **Recommendations for Cotton Dusting for Coming Season.**—*Georgia State Bd. Ent.*, Bull. 62, 9 pp. Atlanta, Ga., March 1922. [Received 17th December 1923.]

The dusting experiments against the cotton boll weevil [*Anthonomus grandis*, Boh.], carried out for the past few years in Georgia [*R. A. E.*, A, x, 20], have shown that calcium arsenate dust gives the best results. Where infestation is at all heavy, two applications, using 5 lb. per acre, should be made, with an interval of 3 or 4 days, just before the cotton squares begin to form sufficiently for oviposition ; afterwards the field should be examined closely, and, where punctured squares appear, they should be picked off and the places dusted. If the infestation is spreading generally, dust should be applied every 5 or 6 days, or 3 or 4 times at 4 day intervals. Dusting on damp, foggy days gives better results than in dry weather, and should be continued until the bolls are matured at the top of the plant. Night or early morning is the best time for dusting.

STRICKLAND (E. H.). **Biological Notes on Parasites of Prairie Cutworms.**—*Canada Dept. Agric.*, Bull. N.S. no. 26 (Ent. Bull. 22), 40 pp., 20 figs. Ottawa, 1923.

Cutworms are the most serious insect pests damaging crops in Southern Alberta. The most destructive are *Porosagrotis orthogonia*, Morr., the larvae of which hatch in the spring and are subterranean in habit, seldom appearing above ground; *Euxoa ochrogaster*, Gn., the larvae of which hatch in spring and autumn and feed both above and below ground, appearing at the surface even in daylight ; and *Chorizagrotis auxiliaris*, Grote, the larvae of which hatch in autumn and feed entirely above ground. Other species that seldom cause much damage, and are important chiefly as alternative hosts of the double-brooded parasites, are *Euxoa tristicula*, Morr., which hatches in late summer ; *Agrotis fennica*, Tausch., hatching in spring, and *Sidemia devastatrix*, Brace, a subterranean species that hatches in autumn.

Cutworms, particularly those that live chiefly underground, are very difficult to control, and natural enemies are of the greatest importance in limiting their numbers. An account is given of the chief parasites known in Alberta, complete life-histories of the most important ones having been obtained by induced parasitism.

The Braconid, *Meteorus dimidiatus*, Cress., has at least two generations a year. The adults appear in May, and the females deposit about 12 eggs in a single host. The larvae pass the winter in hibernating cutworms, the parasitised cutworms remaining below ground until the parasites have escaped into the soil, where they spin parchment-like cocoons. The second generation adults emerge early in July. This parasite has been bred from all the commoner species of cutworms. *Apanteles laeviceps*, Ashm., probably has 2 or 3 generations annually,

As many as 34 larvae have been found in one cutworm (*C. auxiliaris*), and 25 adults have been bred from a single host. Cutworms parasitised by this Braconid come above ground just before the parasites escape, and ascend a blade of grass or a straw, to which the escaping larvae attach their mass of light yellow cocoons. This species was bred only from *E. ochrogaster* and *C. auxiliaris*. The Ichneumonid, *Amblyteles subfuscus*, Cress., bred from the same hosts, has probably two generations a year. Only one parasitic larva can mature in each host. The adult is formed in the pupa of the host. Eggs of *Paniscus* sp. ? have been found attached to the integument of larvae of *P. orthogonia* collected during the day on the surface of unbroken sod. They have never been observed on the thousands of cutworms that have been taken from ploughed land. The larva feeds externally on its host and releases its hold only when it has devoured the entire fluid content of the host larva.

A number of undescribed species are grouped under the name *Gonia capitata*, DeG., at least five of which occur in Alberta. The life-history of the commonest species has been worked out, and all are very similar. There is one generation in a year. A single female lays about 4,000 eggs, which are deposited during May, generally on the blades of Gramineae, especially blue-joint (*Agropyron smithi*), and also on cultivated grain crops. Dicotyledons are very seldom attacked. The eggs hatch only after ingestion by cutworms. Although *P. orthogonia*, which is the most favourable host, feeds almost entirely underground, the eggs of the parasite are laid as frequently at the top of the plants as elsewhere. Eggs laid on spring wheat are therefore more liable to be ingested by cutworms than those laid on autumn wheat, while a rapid growth of vegetation in June probably reduces parasitism. The eggs hatch in the mesenteron of the host, and the larvae burrow through the peritrophic membrane and the mesenteric wall to the body cavity, and then to the supra-oesophageal ganglia. There they feed very little, but upon their subsequent escape into the body cavity they are seldom attacked by phagocytes. Unfed larvae that have not entered a ganglion are almost invariably surrounded by phagocytes, which ultimately cause their death by asphyxiation. The larvae apparently do not form respiratory openings in the cuticle of their hosts until the latter have pupated. They invariably mature inside the pupae and hibernate in puparia in the earthern pupal cells formed by the host. The adults emerge in April and May. This Tachinid is probably the most important parasite of *P. orthogonia*. As it has only one generation in the year it is independent of any other host, and can always increase to its maximum abundance during outbreaks of the cutworm. It has also been bred from *E. ochrogaster*. Another Tachinid, *Bonnetia compta*, Fall., apparently has two generations annually, and is an important parasite of *P. orthogonia*, from which adults emerge in late July. The females oviposit on vegetation, and the eggs hatch within a few minutes after they are laid. The larva attaches itself to a passing cutworm and makes an incision in the cuticle, through which it passes, with the exception of the caudal extremity, which must remain in contact with the air. Many of the larvae are destroyed by the mandibles of the host while they are penetrating the integument, and many more die soon after they have entered the body. Those that live remain with their spiracles near the open wound through which they entered till they are mature, an integumental cyst being formed around them by the host. The

mature larvae escape from their host before they transform into pupae. The summer generation of adults has been bred from *P. orthogonia* only; adults of the hibernating generation have been bred from *E. tristicula* in Montana and one has been bred from *Copablepharon viridisparsa*, Dod.

TREHERNE (R. C.). **The European Earwig in British Columbia.**—*Proc. Ent. Soc. Br. Columbia*, Econ. Ser. no. 17 & 19, pp. 161–163. Vancouver, B.C., October 1923.

Only one species of earwig, *Labia minor*, L., was known in Canada until a few years ago, but recently the European earwig, *Forficula auricularia*, L., has become established in the Coast cities of Vancouver, New Westminster and possibly Victoria, and threatens to become a pest of importance under suitable conditions. There are many possibilities of introduction; earwigs have been taken in merchandise at the ports and in nursery stock, bulbs and plants imported from Europe. They are liable to cause material damage to flowers and vegetables, and may enter houses in numbers. In houses, sodium fluoride mixed with an equal part of flour and scattered where the insects are numerous is an effective measure, while in gardens, in soil adjoining houses, napthaline, soot or lime, applied in autumn, will act as a deterrent. In the open garden, a poison bait of 1 part Paris green to 16 parts stale bread (by weight) mixed with water can be successfully used against the larvae in May and June. Three applications in 10 days are suggested, warm evenings being the best time for scattering the bait. The English method of using inverted flower-pots filled with straw as traps, under which the adults hide in the day time, is also described.

VENABLES (E. P.). **The Relation of the Predatory Mite, *Hemisarcoptes malus*, Shimer, to the Oyster-shell Scale in British Columbia.**—*Proc. Ent. Soc. Br. Columbia*, Econ. Ser. no. 17 & 19, pp. 164–167. Vancouver, B.C., October 1923.

The establishment of the predatory mite, *Hemisarcoptes malus*, in British Columbia, and its value in destroying the oyster-shell scale [*Lepidosaphes ulmi*] is described [*R. A. E.*, A, vii, 242].

GLENDENNING (R.). **Insects of Economic Importance in the Fraser Valley in 1921.**—*Proc. Ent. Soc. Br. Columbia*, Econ. Ser. no. 17 & 19, pp. 167–172. Vancouver, B.C., October 1923.

A review is given of the chief insect pests occurring in the Fraser Valley in 1921, the information having been gathered from previous reports that have been noticed in this *Review*.

ANDERSON (W. B.). **The Relation of Botany to Entomology.**—*Proc. Ent. Soc. Br. Columbia*, Econ. Ser. no. 17 & 19, pp. 172–174. Vancouver, B.C., October 1923.

The author points out the importance of a knowledge of botany to entomological workers, especially in identifying the food-plants of insect pests.

LYNE (W. H.). **Effect of Fumigation on certain Insects.**—*Proc. Ent. Soc. Br. Columbia,* Econ. Ser. no. 17 & 19, pp. 174–176. Vancouver, B.C., October 1923.

The importance of fumigating nursery stock as a protection against the introduction of insect pests is pointed out, and also that in the case of Coccid infestation, when the eggs cannot be killed by fumigation, dipping the stock in a caustic solution is the better remedy. Certain experiences in connection with the fumigation of nursery stock are recorded. A cluster of eggs of gipsy moth [*Porthetria dispar*] from France hatched normally in spite of fumigation. Fumigation with the usual formula of hydrocyanic acid gas against the brown-tail moth [*Nygmia phaeorrhoea*] showed that the gas had very little effect on larvae enclosed in perfect nests, but that when the nests were torn open before exposure to the gas the effect was to kill many rapidly, while all were dead within about 48 hours. Adults of many species of Aphids were killed by the gas, but the eggs survived; *Eriosoma lanigerum* appeared to be the most resistant and may perhaps have survived in the adult state. Adult red spiders were all killed, but the eggs of these mites hatched when exposed to the warm rays of the sun shortly after leaving the fumigation chamber. It would require a much stronger dose of hydrocyanic acid gas than the ordinary to kill *Aegeria* (*Sanninoidea*) *exitiosa* (peach root borer), although many of the larvae are more or less affected by the gas, and the same may be said of *Pennisetia* (*Bembecia*) *marginata* (blackberry root borer). It is hoped that the vacuum system of fumigation [*cf. R. A. E.*, A, xi, 51] may effect a great improvement in the condition of nursery stock in the near future.

TREHERNE (R. C.). **The Peach Twig Borer** (*Anarsia lineatella*) **in British Columbia.**—*Proc. Ent. Soc. Br. Columbia,* Econ. Ser. no. 17 & 19, pp. 176–183. Vancouver, B.C., October 1923.

Further details are recorded on the life-history of and best methods of spraying for *Anarsia lineatella* as worked out in 1918 and 1919 [*R. A. E.*, A, vii, 171; viii, 322].

HOPPING (R.). **Forest Entomology.**—*Proc. Ent. Soc. Br. Columbia,* Econ. Ser. no. 17 & 19, pp. 183–187. Vancouver, B.C., October 1923.

The necessity for forest preservation and the best methods of dealing with forest insect problems are discussed [*R. A. E.*, A, viii, 489; ix, 541].

LOVETT (A. L.). **The Status of Spreaders in the Poison Spray Solution.**—*Proc. Ent. Soc. Br. Columbia,* Econ. Ser. no. 17 & 19, pp. 189–194. Vancouver, B.C., October 1923.

The experience of various workers in testing casein as a spreader in lead arsenate sprays is discussed. Summarising the various opinions that have been expressed from different parts of the United States, and the results of experiments in British Columbia, it is considered that while there is some doubt regarding the value of spreaders in increasing the toxicity of a spray, they are an advantage when used by experienced operators in carefully timed applications. As they

increase the evenness of the spray deposit, a more even colouring of the fruit is possible. The addition of spreaders to other applications than poison sprays seems equally desirable and effective in increasing their value.

STELLWAAG (F.). **Die Benetzungsfähigkeit flüssiger Pflanzenschutzmittel und ihre Messbarkeit nach einem neuen Verfahren.** [The Wetting Power of Liquid Media for protecting Plants and its Measurableness by a new Method.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, iii, nos. 11 & 12, pp. 85–86, 89–90. Berlin, December 1923.

In investigations on the wetting power of liquids, surface-tension has been the character chiefly studied hitherto, but for a practical test of the liquids used in plant protection work it is necessary to consider the tensions of the plant surface or that of the skin of insects as well as the surface tension of the liquid. The author has developed an arrangement by which it is possible to read the angle formed by the surface of the liquid and surfaces of glass, metal, vegetable and animal substances. Some of the readings are given in a series of tables, and show the wetting power of water on various leaves and insects, the wetting power of various insecticides, the increase in wetting power conferred by various substances—of which soap was found the best—and the variation in wetting power at various strengths of solution.

MILLER (A. E.). **The Mexican Bean Beetle.**—*Ohio Agric. Expt. Sta.*, viii, no. 9–10, pp. 154–157, 4 figs. Wooster, Ohio, October 1923.

The Mexican bean beetle [*Epilachna corrupta*, Muls.] has been rapidly spreading northward, and has now appeared in Southern Ohio, where it is expected that two generations a year will occur. All attempts at poisoning have proved unsuccessful, though experiments in this direction are being continued. The cultural methods that have been adopted in Alabama [*R.A.E.*, A, ix, 374] are quoted as being well adapted to conditions in Ohio. It is hoped that a Tachinid parasite that has been introduced from Mexico into Alabama may prove an important factor in control.

FERRIS (G. F.). **Observations on the Chermidae (Hemiptera Homoptera). Part I.**—*Canad. Ent.*, lv, no. 11, pp. 250–256, 2 pls. Orillia, Ont., November 1923.

The objects of the paper of which this forms the first part are to describe and figure the immature stages of Psyllids so as to permit the positive determination of the species concerned in the absence of material for comparison, and to obtain a classification based on the nymphs as a check upon that based on the adults. Where necessary additions will also be made to existing descriptions of the adults.

The species here dealt with are *Psyllopsis fraxinicola*, Foerst., from "eastern black walnut" and *Fraxinus* in California and Idaho; and *Ceropsylla sideroxyli*, Riley, from *Sideroxylon masticodendron* in Florida.

GARLICK (W. G.). **Notes on the Feeding Habits of an Adult Sawfly.**—*Canad. Ent.*, lv, no. 11, pp. 256–257. Orillia, Ont., November 1923.

Adults of *Macroxyela ferruginea*, Say (elm sawfly) were observed in numbers feeding on the buds of American elm [*Ulmus americana*] and to a lesser extent on the buds of pear and plum in Kansas.

MCATEE (W. L.). **Tingitoidea of the Vicinity of Washington, D.C. (Heteroptera).**—*Proc. Ent. Soc. Wash.*, xxv, no. 7–8, pp. 143–151. Washington, D.C., November 1923.

This paper contains an annotated list of the Tingidae from the vicinity of Washington recorded in 1923, and a table comparing the numbers of each genus with those collected in New Jersey in 1922 and Ohio in 1916.

SCHAUS (W.). **A New Genus and Species of Moth of Economic Interest in the United States National Museum.**—*Proc. Ent. Soc. Wash.*, xxv, no. 7–8, p. 164. Washington, D.C., November 1923.

A Noctuid, *Saccharophagos mochisa*, gen. et sp.n., is described from Mexico. The larvae feed on dry tissue of sugar-cane stumps and are confined to a single internode.

ROHWER (S. A.). U.S. Bur. Ent. **A New *Macrocentrus* reared from the Strawberry Leaf-roller (Hymenoptera, Braconidae).**—*Proc. Ent. Soc. Wash.*, xxv, no. 7–8, pp. 168–169, 1 pl. Washington, D.C., November 1923.

Macrocentrus ancylivora, sp.n., is described from New Jersey, where it was reared from the larvae of *Ancylis comptana* (strawberry leaf-roller).

RUGGLES (A. G.). **General Report on the Activities of the Entomologist, including Insect Conditions and a Financial Statement.**—*19th Rept. Minnesota State Ent., 1921–1922*, pp. 3–9. Univ. Farm, St. Paul, Minn., 1st November 1923.

This report covers the two years 1921 and 1922. In view of climatic conditions certain pests were more troublesome in 1921 than usual, including *Heliothis obsoleta*, F. (corn ear worm), and *Empoasca mali*, LeB. (potato leaf-hopper). *Melanoplus bruneri*, Scud., was reported for the first time as causing any damage in Minnesota. Pests of stored grain, including *Calandra granaria*, L., were also unusually destructive in 1921. In 1922 serious injury to winter wheat was caused by *Mayetiola destructor*, Say (Hessian fly); *Rhagoletis pomonella*, Walsh (apple maggot) caused damage to apples, and where it occurs additional lead arsenate sprays should be applied about the middle of July and the first week in August; *Lepidosaphes ulmi*, L., was more abundant in Southern Minnesota and should be treated with dormant lime sulphur or miscible oil as late as possible in the spring; *Crioceris asparagi*, L. (asparagus beetle) had continued to spread. Other pests of unusual abundance during 1922 were *Cimbex americana*, Leach, *Agrilus ruficollis*, F. (red-necked cane-borer), *Lopidea davisi*, Knight (phlox bug), *Anthonomus scutellaris*, Lec. (plum gouger) and *Heterocordylus malinus*, Reut. (dark apple red bug).

The forest pests recorded were *Tortrix* (*Harmologa*) *fumiferana*, Clem. (spruce budworm), *Malacosoma disstria*, Hb. (forest tent caterpillar), *Diprion abietis*, Harr., injuring Jack pine [*Pinus banksiana*] and *Bucculatrix canadensisella*, Chamb. (birch skeletoniser).

RUGGLES (A. G.) & EYER (J. R.). **Preliminary Notes on the Life-history and Control of the Potato Leaf-hopper, *Empoasca mali*, LeB.**—*19th Rept. Minnesota State Ent., 1921–1922*, pp. 10–14. Univ. Farm, St. Paul, Minn., 1st November 1923.

The adults of *Empoasca mali*, LeB., feed indiscriminately on apple, box elder, blackberry, raspberry, curly dock (*Rumex crispus*), rhubarb and *Dahlia* in Minnesota when potato is not available. Only the adults survive the winter. During 1922 they were first seen to emerge from hibernation in the latter part of May, feeding on box elder and blackberry, and were first noticed on potatoes on the 7th June, becoming abundant towards the middle of the month. Eggs were found in the stems and midribs on the 12th June, and the resulting nymphs required about 20 days to reach the adult stage. These adults were most abundant in August, living from 25 to 50 days. They laid their eggs from the latter part of July until early October, the nymphs requiring about 30 days for development into adults. The latter feed on potato until the plants are killed by frost, after which they migrate to other food-plants until hibernation.

Spraying experiments with various insecticides have proved the value of Bordeaux mixture, but it is not very effective in the dust form either alone or in combination with a nicotine dust.

GRAHAM (S. A.). **The Red Turpentine Beetle in Itasca Park.**—*19th Rept. Minnesota State Ent., 1921–1922*, pp. 15–21. Univ. Farm, St. Paul, Minn., 1st November 1923.

Dendroctonus valens, Lec. (red turpentine beetle), though usually considered of secondary importance as a pest, has lately been very abundant in Itasca Park, and apparently responsible for a considerable amount of injury to living trees, Norway pine (*Pinus resinosa*) being most frequently attacked. In one area during the winters of 1920–22 it was found that 30 per cent. of the trees were infested. Subsequently observations showed that the infestation of healthy trees is correlated with the presence of green logs, fresh stumps, trees killed by lightning, or windfalls in the immediate vicinity. The beetles are also apparently attracted to freshly burned areas, the trees nearest to such areas being more heavily infested than those further away. The greatest infestation was always found where logs had been piled, though trees in the vicinity of stumps were always more or less infested. Infestation was heaviest during the second season after the trees were cut. Only in one case could the death of a tree be attributed without doubt to attack by *D. valens*. It is exceedingly rare to find any brood emerging from infested living trees, the adults entering such trees are generally drowned by the flow of resin or forced to leave. It would appear therefore that beetles attack living trees either owing to a failure of instinct or because they are too numerous to be accommodated in the available suitable material. No sign of attack was ever found in slash piles or in any part of the tree that came from a point higher than 6 or 8 feet from the ground. Only butt cuts were infested, the attack being

most severe in the stump end. As a rule, logs do not furnish very suitable breeding-places, and it is thought that the infested trees in the vicinity of logs are not attacked by beetles emerging from the logs, but by those attracted to the spot by the presence of freshly cut material. The favourite breeding-places are the freshly cut Norway pine stumps, these are almost always found infested. Both barking and burning operations were tried for the control of these beetles : barking should be done in the early summer months for the best results; burning, if thoroughly done, is more effective, but expensive. Further work is needed to find out the best method of handling logging debris.

GRAHAM (S. A.). **Effect of Physical Factors in the Ecology of certain Insects in Logs.**—*19th Rept. Minnesota State Ent., 1921–1922,* pp. 22–40. Univ. Farm, St. Paul, Minn., 1st November 1923.

In the experiments here described the insects were studied as far as possible under their natural environment. The following is taken from the author's conclusions :—The activities of insects working in logs are greatly influenced by the environmental conditions. These conditions may be modified by the action of external physical factors, the effect of which varies according to the characteristics of the species of log and of the individual log within the species.

The food value of logs is determined primarily by the chemical composition, which is in turn dependent upon the species of tree and the part of the log under consideration. The cambium and phloem regions are comparatively high in protein, whereas the other parts of the tree contain little protein, but are high in carbohydrates. This results in the definite localisation of certain insects within the log, and also leads to variation in the rate of insect development. Thus the rapidly developing insects are localised in the areas in which the wood is most nourishing, *i.e.*, the cambium and phloem. The insects in the heart wood develop, as a rule, quite slowly. In some cases development is made possible or the rate of development is hastened by the presence of micro-organisms in the wood. These organisms, having the ability to convert cellulose into proteins, sugars, and starches, increase the nutritive value of the wood. Many insects are unable to develop in the absence of these organisms. In logs, the process of decay depends largely upon the character of infection and the time at which the organisms gain entrance into the log. Insect infection often determines to a very marked degree the time and the extent of fungous infection in the log.

A highly important factor in regulating insect activity within the log is heat. Since a large proportion of the light that strikes upon the log is converted into heat units, it is very difficult, in the effect upon insects, to distinguish between these two factors. Heat may be divided into optimum, active, dormant, and fatal zones, and theoretically light may also be thus divided. The effect of temperature varies according to humidity conditions. There is evidence that variations of light intensity also influence the effect of temperature upon insects. It has been shown with adults of *Chrysobothris* that changes of temperature may bring about changes in the reaction of insects to light. Differences in temperature conditions are sufficient to account for the great differences in the length of life-cycles of insects that have been observed. For example, *Monochamus* may, under favourable conditions, complete its development in a single season, whereas under less favourable conditions two or even three years are required.

The correlation of temperature, light, and relative humidity readings with the active periods of the insects has shown that conditions favourable for the activity of one group are not necessarily favourable for the activity of another group. *Monochamus* adults appear to have an extremely wide range of active temperature, and fly at almost any time during the day. *Chrysobothris* requires high temperature and bright sunlight before it reaches its maximum state of activity. Other Buprestids, such as *Dicera* and *Chalcophora*, are active at lower temperatures than *Chrysobothris*.

Subcortical temperature was very variable in the same log. Also there was considerable difference between logs of the same species and still more between logs of different species. The subcortical temperature on the upper side of certain logs exposed to full sunlight often reached a temperature far above that fatal to insects [*cf. R. A. E.*, A, viii, 365]. The present series of experiments has shown, however, that the application of solar radiation as a method of control is limited in its scope. Many heat-resistant insects, such as larvae of *Chrysobothris*, can withstand extremely high temperatures for short periods and are thus able to develop normally on the upper side of many logs lying in the sun. It is true that most insects succumb to such conditions. On the other hand, some logs, such as those of Norway pine [*Pinus resinosa*], which have scaly bark, highly efficient as an insulator, never reach extremely high temperatures.

Solar radiation, the character of the bark, air temperature, air movement, evaporation from the bark surfaces, and proximity to other radiating or absorbing surfaces, are the most important factors controlling the subcortical temperature of logs.

The fatal temperature for insects varies under different conditions. There is considerable variation within a single species and even greater differences between different species. It appears that *Chrysobothris* has a much higher fatal temperature than any other of the insects studied. The adults were able to endure temperatures up to 52° C. [125·6° F.], while the larvae were apparently still more resistant to heat. Cerambycid larvae have a much lower fatal temperature than *Chrysobothris*. The only bark-beetle for which the fatal temperature was determined was *Pityokteines sparsus*, Lec. It was comparatively low for this species, as the beetles passed into a state of aestivation at about 43·°C. [109·4° F.] and were practically all killed at 47° C. [116·6°F.]. This is about the point at which the majority of insects succumb.

That moisture conditions within the log have an important effect upon the activities of xylophagous insects is shown by the distribution of beetles in logs under different conditions. Some are very exacting in their requirements and occur only in narrowly limited areas. For example, *Hylastes* (*Hylurgops*) *pinifex*, Fitch, is always found in cool, moist locations. Unfortunately, the attempt to measure the moisture content of logs was not attended with much success because of the few observations that could be made during the season.

The effect of physical factors is well illustrated by the distribution of the insects under different conditions. The effect of high temperature is clearly shown in logs in the open. On the upper side of these logs are found only insects that are most resistant to heat, such as *Chrysobothris*. Under the shade, where cooler conditions obtain, the heat-loving insects disappear, whereas the insects that develop best under cool conditions become more and more abundant. Three-quarters shade was the heaviest used in these experiments. Under this condition

no *Chrysobothris* was present, and there appeared to be some reduction in abundance of *Monochamus*, while there was a distinct reduction in the developmental rate of all species represented. From this it seems probable that still greater shading would check *Monochamus* as well as *Chrysobothris*. If this is true, the shading of logs that must be left in the woods over the summer season may prove the most satisfactory method for controlling wood-boring insects.

KNIGHT (H. H.). **Studies on the Life-history and Biology of** *Perillus bioculatus* **Fabricius, including Observations on the Nature of the Colour Pattern (Heteroptera, Pentatomidae).**—*19th Rept. Minnesota State Ent., 1921-22*, pp. 50–96, 1 fig., 3 pls. Univ. Farm, St. Paul, Minn., 1st November 1923.

Since 1913 extensive studies have been carried out on the life-history and colouring of the Pentatomid, *Perillus bioculatus*, F. (double-eyed soldier bug), which is of economic importance in the control of *Leptinotarsa decemlineata*, Say (Colorado potato beetle). The classification, synonymy and distribution of *P. bioculatus* are discussed—it has apparently followed the migrations of *L. decemlineata* in the United States and Canada—and the technique employed in rearing the insects is described.

The hibernating adults emerge as soon as the ground thaws in the spring. For a short time they feed on the sap of the potato plants, but after that almost exclusively on the body fluids of *L. decemlineata*. They have occasionally been recorded as feeding on other insects, some of which are listed. The eggs are laid in masses on the leaves of the potato plant, and hatch in 5 or 6 days. The nymphs feed on the eggs and small larvae of *L. decemlineata*. The nymphal life lasts about 19 days. The number of broods during the year depends on climatic conditions, varying as a rule between 2 and 3 according to how early the first eggs are laid. Though of great value in checking the numbers of *L. decemlineata*, *P. bioculatus* cannot be wholly relied upon, as owing to various factors it hardly ever appears in sufficiently large numbers during the first brood of its host, and though it increases in abundance, its numbers are soon reduced again by feeding on beetles that have eaten poisoned food. *P. bioculatus* is much more sensitive to arsenicals than its host.

P. circumcinctus, Stål, has sometimes been confused with *P. bioculatus*; the points of difference are discussed and brief notes are given on the life-history of *P. circumcinctus*. It feeds on *Trirhabda canadensis*, Kirby (goldenrod beetle), but has also been observed to feed on *L. decemlineata*. It has only one brood a year.

PEMBERTON (C. E.). **Notes on Armyworms and Cutworms.**—*Hawaiian Planters' Record*, xxvii, no. 4, pp. 257–258, 2 figs. [Honolulu] October 1923.

Cirphis unipuncta was chiefly responsible for the severe damage caused to sugar-cane in 1923 at Honokaa. Young sugar-cane suffered particularly and the damage extended from an elevation of about 800 feet to the highest fields, most of the leaf tissue being removed. The expected second generation did not appear, for though moths emerged in fair quantity very few eggs were laid. At the close of the

outbreak natural enemies, such as *Polistes* and the Tachinid parasites, *Chaetogaedia monticola* and *Frontina archippivora*, particularly the latter, were abundant.

Of the various remedial measures the best results were obtained with a dry dust composed of a mixture of 1 part Paris green to 8 parts air-slaked lime. Closed sugar-bags partly filled with the mixture were shaken over the sugar-cane, thus ensuring an even distribution of the dust. This method is more satisfactory than that of applying a moist bran or bagasse mash containing the poison.

Jorgensen (P.). **Sobre algunos nuevos enemigos de la Yerba-Mate,** *Ilex paraguariensis*. [On some new Enemies of *I. paraguariensis*.] —*Rev. Soc. cient. Paraguay*, i, no. 2, pp. 27–30. Asuncion, October 1921. [Received 15th December 1923.]

Notes are given on six Lepidopterous pests of *Ilex paraguariensis* in South America, *viz.*, the Nymphalid, *Adelpha calliphiclea*, Butl., the Erycinid, *Emesis mandana*, Cr., the Hesperiid, *Thymele fulgurator*, Walsh, the Saturniid, *Rothschildia aurota*, Cr., the Sphingid, *Pengonia lusca*, F., forma *ilus*, Bsd., and the Geometrid, *Microgonia apidania*, Cr.

Bertoni (A. de W.). **Principales enemigos de los coccidos importados observados en Asuncion.** [Chief Enemies of imported Coccids observed in Asuncion.]—*Rev. Soc. cient. Paraguay*, i, no. 4–5, pp. 53–55. Asuncion, July 1923.

The natural enemies dealt with include the Discolomid, *Coccidophilus citricola*, Breth., and the Coccinellids, *Cycloneda sanguinea*, L., and *Azya pusilla*, Weise, which attack *Pseudococcus* spp., and the Chalcids, *Eretmocerus corni*, Hald., a parasite of *Lepidosaphes beckii*, Newm., and *Marietta leopardina*, Mot., an effective parasite of *Chrysomphalus aonidum*, L.

Bondar (G.). **Os insectos damninhos. xxx. O gorgulho do cacaoeiro,** *Heilipus clavipes*, **F.** [Injurious Insects. xxx. The Cacao Tree Weevil, *H. clavipes*.]—*Chacaras e Quintaes*, xxviii, no. 5, p. 399, 1 fig. S. Paulo, 15th November 1923.

Cacao plantations at Jequié in the Brazilian state of Bahia are severely injured by the adults of *Heilipus clavipes*, F. This weevil is crepuscular and nocturnal in habit. It bores into the young shoots and pods. The young shoots wither and die, and infested pods either fail to develop or rot. The larva of this weevil has not yet been seen by the author; it probably lives on a wild plant, which should be discovered and controlled. At present it is advised that insectivorous birds should be encouraged, and wild plants cleared in places where the infestation is observed.

Kunhi Kannan (K.). **The Lime** (*Citrus*) **Tree Borer** (*Chelidonium cinctum*, **Guér.**).—*Jl. Mysore Agric. & Exptl. Union*, v, no. 3, pp. 129–131. Bangalore, 1923.

Further study of the Cerambycid, *Chelidonium cinctum*, Guér. [*R.A.E.*, A, viii, 84; x, 485], which is a serious pest of lime trees and other species of *Citrus*, has shown that the adult emerges from the pupa in the hot season, in late April or early May, but remains within

the pupal chamber for a considerable time. Eggs have been found late in June, and after hatching, the larva bores into the twig just below the egg and cuts a corkscrew-shaped tunnel round it and into the pith, so that the twig is very easily broken off. Gum exudes from the entrance to the tunnel, and the sap is cut off from the twig by the corkscrew cut and by the ventilation holes that the larva makes at intervals in the tunnel. The larva remains in the drying twig at least a month, and during this time the withering of the twig and the exudation of gum renders infestation conspicuous. With a long stick ending in a narrow fork these twigs can easily be broken off, and may be left on the ground, as the larvae are unable to travel back to the tree.

MAHDIHASSAN (S.). **Observations on the Life-cycles of South Indian Lac Insects.**—*Ind. Forester*, xlix, no. 12, pp. 653–663. Allahabad, December 1923.

Notes are given on the dates of the larval swarming and the emergence of males of the trivoltine form of *Tachardia lacca*, Kerr (*Lakshadia mysorensis*, Mahd.), which occurs only on *Shorea talura*, the bivoltine form of the same species that occurs on a number of different trees (for which the author suggests a *nomen nudum*), and *Tachardina* (*Tachardia*) *minuta*, Morr.

With regard to the first of these, which is the only species of importance in lac production in Mysore [*R.A.E.*, A, xii, 5], it has been discovered that the larval swarming is associated with lunar periodicity and that there are three crops in 13 lunar months. The crop that matures during the rains is the best, the one immediately following it being the longest in duration and the poorest in quality. The explanation given for this is that the insects harbour intercellular micro-organisms that are the conidia of a moisture-loving fungus, and therefore the greatest yield is associated with the rains.

OSHIMA (M.). **Fauna Simalurensis. Termitidae.**—*Capita Zoologica*, ii, no. 3, pp. 1–22, 20 figs. The Hague, 1923.

Eight new species of Termites are described, from Simalur, Dutch East Indies, and a redescription is given of *Coptotermes curvignathus*, Holmg., stated to be the most serious pest of rubber in the Malay Peninsula.

PHILLIPS (E. F.). U.S. Bur. Ent. **The Brood Diseases of Bees.**—*Bee World*, v, no. 7, pp. 101–103. Benson, Oxon, December 1923.

Owing to the confusion that frequently arises in diagnosing brood diseases of bees, and the impossibility of successful treatment without correct diagnosis, an account is given of sacbrood and American and European foulbrood, with instructions for their treatment.

Lucha biológica contra los parásitos de las plantas. [Biological Control against Plant Pests.]—*Rev. Inst. Agríc. Catalan S. Isidro*, lxxii, no. 11, p. 226. Barcelona, November 1923.

The Agricultural Department of Catalonia has arranged for the collection of *Opius concolor* in Tripoli for use against the olive fly,

Dacus oleae. Quite recently 8,220 individuals of the parasite were received and liberated.

The Department has also obtained batches of the Coccinellid, *Novius cardinalis,* for checking *Icerya purchasi.*

[**Reports on the State of Crops in each Province of Spain on the 20th of November 1923.**]—*Bol. Agric. Téc. Econ.,* xv, no. 179, pp. 1065–1080. Madrid, 30th November 1923.

The outbreak of *Icerya purchasi* in the Balearic Islands has been completely wiped out by *Novius cardinalis.* Olives in Guadalajara are being attacked by *Euphyllura olivina* (*Psylla oleae*) and *Phloeothrips oleae*; against the latter fumigation with hydrocyanic acid gas is being employed in Jaén.

Bewley (W. F.). **Minute "Organisms" isolated from the Virus of Mosaic Disease of Tomato.**—*Nature,* cxii, no. 2825, p. 903. London, 22nd December 1923.

Minute bodies isolated from the filtered virus of tomato mosaic are described. There are indications that they may possibly be causally related to the disease.

Auton (W.). **Woolly Aphis.**—*Gardeners' Chron.,* lxxiv, no. 1930, p. 369. London, 22nd December 1923.

Where infestation by *Eriosoma* (*Schizoneura*) *lanigerum* occurs, all loose bark should be removed immediately after the leaves fall, and the trees should be sprayed with a caustic emulsion. A good formula is the following:—Dissolve 1½ lb. soft soap in 1 gal. boiling water, add gradually 2 gals. paraffin, churning up the whole with a syringe until it becomes a thick, creamy emulsion; stir this emulsion into 27 gals. water in which 6 lb. caustic soda has previously been dissolved. To combat root attack, carbon bisulphide should be injected into the soil about two feet from the tree trunks. Tits are the most useful natural enemy of the woolly aphis.

Theobald (F. V.). **Two Aphides or Plant Lice of Economic Importance new to Great Britain.**—*S. E. Agric. Coll.,* Adv. & Res. Dept., Bull. 3, 11 pp., 5 figs. Wye, Kent, November 1923. Price 1s.

Descriptions are given of the alate and apterous viviparous females and male of *Anuraphis tulipae,* Boy. (*gladioli,* Felt). It occurs on stored bulbs in Britain and U.S.A., and has been taken to New Zealand on bulbs from Scotland, the food-plants including *Tulipa, Gladiolus, Lilium, Scilla, Chionodoxa, Crocus,* etc. According to Felt, the Aphids are unable to breed on bulbs stored during the winter at about 40° F., but as the temperature becomes warmer in spring, they appear in enormous numbers. Breeding generally occurs about the base of the roots and continues from March into July, many winged individuals appearing in late July, though they undoubtedly occur earlier than this in warehouses. By mid-August all had disappeared, both in storage and in the field, having evidently become dormant for the winter. The author kept individuals alive in the laboratory until 20th December; during that time several alate generations

appeared, and at the end of November some males were present, though no oviparous females were observed. Reproduction in one case occurred on potatoes. The most severely attacked bulbs sent up no flower heads and a few rotted away. Fumigation for half an hour with tobacco shreds was found effective for large quantities, but sulphur was not successful. The best treatment discovered was to immerse the bulbs for 2 minutes in a bath of ½ oz. nicotine (95–90 per cent.) and 2 oz. soft soap in 10 gals. water, and dry them gradually.

The apterous and alate viviparous females of *Anuraphis warei*, sp.n. (clover blossom Aphid) are described from wild red clover kept for seed in Kent, which has been seriously attacked. The food-plants include *Trifolium pratense* (red), *T. repens* (white), *T. hybridum* (alsike), *T. scabrum* (rough) and cultivated red clover. This Aphid occurred in August 1923 in vast numbers in and around a field of 8 acres of seed-clover, chiefly of the wild red variety. The heads had failed to develop and the crop was ruined. White wild clover in the same field was also attacked, but to a less extent. In mid-August nearly all the insects were apterous females, larvae, and very few nymphs; the first alate female appeared on 19th August and they increased until the 29th, when they decreased, though some could be found up to mid-November. No sexuales occurred. Attempts to infect other plants all failed. Very few natural enemies were present. A Hymenopteron, *Aphidius* sp., was found parasitising a small percentage, and Cynipid hyper-parasites were bred out. *A. warei* bears much resemblance to *A. helichrysi*, Kalt., and may eventually prove to be only a variety or race of that species.

Stellwaag (F.). **Zur Biologischen Bekämpfung von Schädlingen, insbesondere der Schädlinge des Weinstockes.** [The Biological Control of Pests, especially Pests of the Grape-vine.]—Reprint, 2 pp. from *Weinbau und Kellerwirtschaft*, ii, no. 20. Freiburg i. Br. [1923].

The conditions necessary for the biological control of insect pests are described, and the qualities that a natural enemy should have if it is to be effective are enumerated.

Quanjer (H. M.). **General Remarks on Potato Diseases of the Curl Type.**—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 23–28, 4 pls. Wageningen, 1923.

Notes are given on leaf-curl and allied diseases of potatoes, their transmission and the relation of Aphids to them [*cf. R.A.E.*, A, x, 236]. The control of these diseases in Holland is also briefly noticed.

Howard (L. O.). **International Co-operation in combating Plant Diseases and Insect Pests.**—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 36–38. Wageningen, 1923.

After emphasising the importance of national quarantines against plant pests, the author discusses the position of economic entomology as a distinct branch of applied science. He considers that although the work of phytopathologists and economic entomologists must overlap in certain cases and their full co-operation is most important, the amalgamation of these branches of science under one heading is not advisable.

Reh (L.). **Ist Trennung der Phytopathologie in praktische Botanik und praktische Zoo-(Entomo-)logie erwünscht?** [Is the Division of Phytopathology into Economic Botany and Economic Zoo-(Entomo-)logy desirable?]—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 48–50. Wageningen, 1923.

The importance of specialisation in studying the various causes of affections of plants is pointed out, this branch of science being considered too large and comprehensive to be dealt with under one heading.

Gaumont (L.). **Contribution à l'étude de la Famille "Aphididae Pass."** —*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 58–64, 2 pls. Wageningen, 1923.

The author discusses the importance and classification of Aphids, and gives brief notes on various species he has studied.

Gaumont (L.). **Les pucerons de la pomme de terre.**—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 65–66. Wageningen, 1923.

There are four species of Aphids attacking potatoes in France. *Macrosiphum solani*, Kalt., a migratory species, the primary food-plant of which is *Cydonia vulgaris*, hibernates on this plant in the egg stage and remains on it for the first generation in the spring, after which it migrates to Solanaceous plants. In the autumn the winged individuals return to *C. vulgaris*, but parthenogenetic reproduction often occurs on greenhouse plants during the winter, the resulting Aphids infesting the potatoes in the following spring.

The peach (*Persica vulgaris*) is the primary food-plant of *Myzus* (*Myzoïdes*) *persicae*, Pass., which, like the above, is a migratory species, attacking potatoes in the spring and returning to the peach in the autumn.

Aphis rumicis, L. (*euonymi*, F.) is a general feeder, the eggs being found in the winter on a number of shrubs and even herbaceous plants. A list of some of these plants is given, including asparagus, beans, peas, etc. In the case of potato these three species attack the lower surface of the leaves.

Geoica (*Tychea*) *phaseoli*, Pass., is found in the autumn on roots of beans and sometimes on the subterranean stems of potatoes. Only the parthenogenetic forms of this Aphid are known.

Börner (C.). **Die Bekämpfung der "Schwarzen Blattläuse."** [The Control of Black Aphids.]—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 66–69. Wageningen, 1923.

This information has already been noticed from another source [*R.A.E.*, A, x, 505].

Börner (C.). **Das Problem der Reblausrassen.** [The Problem of Races of *Phylloxera*.]—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 69–72. Wageningen, 1923.

The question of different strains of *Phylloxera* and the immunity of certain vines from their attack is discussed [*cf. R.A.E.*, A, ii, 156; x, 617; xi, 342].

DAVIDSON (J.). **The Penetration of Plant Tissues and the Source of the Food Supply of Aphids.**—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923,* pp. 72–74. Wageningen, 1923.

A detailed and illustrated account of the investigations here dealt with has already been noticed from another source [*R.A.E.*, A, xi, 250].

Discussion about International Plant Disease Legislation.—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923,* pp. 86–116 & 216–222. Wageningen, 1923.

A series of addresses on this subject was given by various representatives. The organisation and methods of the phytopathological service of Holland were described by N. van Poeteren. Besides general work against plant diseases and pests, a great deal is done to maintain a healthy condition among products intended for export so as to satisfy all reasonable demands. It is highly desirable to avoid ever-increasing restrictions on international trade, and with due control of the plants, both during the growing period and at the time of export, the danger of transmitting organisms that may become injurious in the country importing them need not be greater than that associated with other articles of trade.

H. T. Güssow emphasised the necessity of an importing country doing everything reasonably possible to prevent the introduction of foreign insect pests and plant diseases. The present regulations governing the importation of living plants, etc., into Canada in so far as they relate to European countries were outlined by A. Gibson. In the opinion of L. Reh a thorough and careful supervision within a country is more important than restrictions on the importation of foreign plants. Should any pest thus gain entry it would be discovered at once, and in most cases could immediately be exterminated. J. C. Kielstra expressed the opinion that the phytopathologist should seek to discover means to diminish the perils connected with import to the lowest attainable minimum. By impeding imports it is certain that he will cause loss to his country, and in order to foster its prosperity he should, in co-operation with students of the same science in other countries, facilitate imports as far as practicable. Such co-operation may lead to the acceptance of similar methods and to mutual confidence in each other's methods, and thereby, eventually, in the value of each other's certificates. As the basic principle of all future relations along these lines a resolution was passed expressing "full agreement with the essentials of trade and commerce in living plants or plant products, namely, reasonable freedom from all insect pests and plant diseases of all kinds of material imported into or exported from any country."

MOREIRA (C.). **Les Capsides du Tabac au Brésil.**—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923,* pp. 283–286, 1 pl. Wageningen, 1923.

The Capsid, *Engytatus notatus,* Dist., is very injurious to tobacco (*Nicotiana tabacum*) in Brazil, and it also occurs in Mexico and the Southern United States.

The eggs are laid in the median nerve of the lower surface of the leaf; they hatch in 7 days, and the adults appear 9 days later. The life of the adults is about 9 days. The generations follow each

other uninterruptedly. As a result of attack the leaves become yellow and dry prematurely; as the Capsids fly from plant to plant, they may also transmit various diseases of the tobacco plant. Another Capsid, *E. geniculatus*, Reut., has a very similar life-history and also occurs on tobacco in Brazil.

A spray containing 1 gal. of water, 1 gal. of kerosene and 8 lb. of hard soap is recommended. This paste should be dissolved in 50 gals. of warm water and allowed to cool; before application 0·1 per cent. of nicotine or nicotine sulphate, that is, 8 oz. per 50 gals. of emulsion, should be added. This spray should be applied every 10 days until the plants are free from infestation.

Mostovsky (St.). **An Abstract of a Report of the "Entomological Study" at Datnow's Agricultural College, Lithuania, Year 1921-1922.**—*Rept. Internat. Conf. Phytopath. & Econ. Ent. Holland 1923*, pp. 287–288. Wageningen, 1923.

Brief notes are given on the bionomics of the following pests as occurring in Lithuania: *Ips typographus*, L., the adults of the first generation appearing about 15th May and those of the second about 15th July; *Pityogenes chalcographus*, L., of which there are also two generations a year; *Hylesinus fraxini*, F.; *Polygraphus poligraphus*, L.; *Scolytus* (*Eccoptogaster*) *intricatus*, Ratz.; *S.* (*E.*) *ratzeburgi*, Jans.; *S.* (*E.*) *scolytus*, F.; *Hylastes palliatus*, Gyll.; *Xyloterus lineatus*, Oliv.; *Myelophilus piniperda*, L.; *M. minor*, Hart.; *Ips laricis*, L.; *Lophyrus rufus*, Kl., on young pine trees, which appears to have only one generation a year, hibernation occurring in the pupal stage (in Holland the winter is passed in the egg stage), and the cocoons being heavily parasitised by Ichneumonids; *Xylotrechus* (*Clytus*) *rusticus*, L., injuring aspens; *Anthonomus pomorum*, L.; *Rhynchites aequatus*, L.; and *Phytometra* (*Plusia*) *gamma*, L., on peas, flax, etc.

Delassus (—). **La Lutte contre le** *Dacus oleae* **ou Mouche de l'Olive. Au Congrès d'Oléiculture de Nice (14-19 October 1923).**—*Rev. agric. Afr. Nord*, xxi, nos. 227 & 228, pp. 780–783 & 793–796, 4 figs. Algiers, 7th and 14th December 1923.

These two parts contain the remainder of the paper previously noticed [*R.A.E.*, A, xii, 37].

Oudemans (A. C.). **Studie over de sedert 1877 ontworpen Systemen der Acari; Nieuwe Classificatie; Phylogenetische Beschouwingen.** [A Study of the Systems for classifying Acari planned since 1877; a New Classification; Phylogenetic Considerations.]—*Tijdschr. Ent.*, lxvi, pp. 49–85. The Hague, 1923.

The title of this paper indicates its contents.

Priesner (H.). **Ein Beitrag zur Kenntnis der Thysanopteren Surinams.** [A Contribution to the Knowledge of the Thysanoptera of Surinam.]—*Tijdschr. Ent.*, lxvi, pp. 88–111, 9 figs. The Hague, 1923.

Nine species are dealt with, including *Heliothrips haemorrhoidalis*, Bch., var. *angustior*, n., from Liberian coffee and wild plants far from

cultivated areas; and *Phloeothrips* (*Hoplandrothrips*) *reynei*, sp.n., from the flower-clusters of a palm, *Carludovica palmata*. A key is given to the species of *Phloeothrips* (sens. lat.).

VAN HEURN (W. C.). **Over een waarschijnlijke parasiet** (*Thripoctenus brui* **Vuillet**) **en een vermoedelijke hyperparasiet** (**Genus ? species ?**) **van** *Thrips tabaci* **Lind.** [A probable Parasite and a possible Hyperparasite of *T. tabaci*.]—*Tijdschr. Ent.*, lxvi, pp. 119–128, 2 figs. The Hague, 1923.

In some years *Thrips tabaci*, Lind., is a serious pest of onions and leeks in Java. As a rule, when the onions are planted the dry season is not completely established, and the first onion crop, lasting about two months, suffers little from thrips if sufficient water is present. There may be a second good crop unless water is scarce, in which case, as in that of a third crop, a considerable loss occurs owing to infestation. The author is convinced, however, that natural enemies are a more effective check than the rains, and this is confirmed by the fact that even very abundant watering is unable to stop an existing outbreak. When this thrips was being bred on a large scale in the laboratory, a decrease in its numbers coincided with the increasing occurrence of two Chalcids. One, *Thripoctenus brui*, Vuillet, is a probable parasite of *T. tabaci*, while the other, which may be a hyperparasite, is described and figured, though the author does not identify or name it.

POMEROY (A. W. J.) & GOLDING (F. D.). **Observations on the Life Histories of the Cotton-stainer Bugs of the Genus** *Dysdercus*, **and on their Economic Importance in the Southern Provinces of Nigeria.** —*2nd Ann. Bull. Nigeria Agric. Dept.*, pp. 23–58. Lagos, 1st July 1923.

Owing to severe damage to cotton in Southern Nigeria caused by cotton-stainers, a detailed study has been made of *Dysdercus superstitiosus*, F., which is by far the most injurious. There are 8 or 9 generations a year. The average number of eggs laid by a female is 237, the greater proportion of which seems to hatch. The eggs cannot withstand the effects of desiccation and direct sunlight, and too much moisture is also injurious to them. The optimum condition seems to be a temperature of about 75° F. in the shade, with the humidity resulting from heavy morning and evening dews. The incubation period lasts from 5 to 6 days, and the nymphal instars from 24 to 29 days. Adults in the laboratory showed a maximum longevity of 57 days for males and 47 days for females. Lack of essential food retards the rate of development and increases the duration of metamorphosis. The first infestation of cotton occurs as soon as the plants flower, and develops suddenly. It generally begins about 23rd September and lasts until 8th October, only adults at first appearing, so that the attack is evidently caused by migrants from other plants. Numbers of the last stage nymphs were found on perennial cotton on adjacent farms, and as this cotton develops green bolls some time previously the infestation probably arises there. Cotton-seed traps, placed round the edges of the cotton plots, which had been very efficacious, ceased to attract the stainers as soon as the cotton flowered. The damage consists of injuring the green and ripening bolls; the staining from excreta is negligible. Experiments

indicate that continuous generations of *D. superstitiosus* cannot be produced on alternative food-plants other than the seeds of silk cotton trees (*Eriodendron anfractuosum* and *Bombax*), *Hibiscus esculentus* (okra) and possibly *Abutilon zanzibaricum*, though it has been found feeding also on *Hibiscus rostellatus*, *H. rosasinensis*, *Sida* spp. and *Urena lobata*.

The predacious Reduviids, *Phonoctonus picturatus*, Fairm., *P. fasciatus*, P. de B., and a species that is probably *P. formosus*, Dist., are apparently effective to some extent in reducing the numbers of the stainers. Tachinid parasites have been studied and a description of some new species is shortly to be published, but they are not considered to be of real economic importance, though they shorten the lives of stainers and prevent oviposition to some extent. Other species of *Dysdercus* that constitute minor pests in Southern Nigeria are *D. melanoderes*, Karsch (which may possibly prove to be a dimorphic form of *D. superstitiosus*), *D. nigrofasciatus*, Stål, which was found only in February and March, and *D. intermedius*, Dist.

It is suggested that a close season should be maintained from April to September, during which no cotton should be left standing, and that all alternative food-plants, especially *Eriodendron* and *Bombax*, should be eliminated as far as possible. Cotton-seed traps would be a useful auxiliary measure if the work were carried out under European supervision; when left to the natives the result is frequently the production of additional breeding-areas. Further study of the question of times of planting and resistant varieties is desirable.

Pomeroy (A. W. J.). **The Production of Anaphe Silk in Nigeria for Export and its possible Economic Value.**—*2nd Ann. Bull. Nigeria Agric. Dept.*, pp. 59–79. Lagos, 1st July 1923.

Investigations have been made to determine the possibility of increasing the output of wild silk in Nigeria by semi-domestication of the species of *Anaphe*, and a study of the life-histories of *A. infracta*, Wals. (which is the most important from a commercial point of view), *A. ambrizzia*, Butl., *A. venata*, Butl., and *Epanaphe moloneyi*, Druce, has been made. The life-history of *A. infracta* in Nigeria greatly resembles that described in the Belgian Congo [*R.A.E.*, A, ii, 547]. The author of the present paper has found that the egg mass is laid, under natural conditions, on the lower surface of the leaves of *Bridelia micrantha*, the incubation period requiring an average of 30½ days. The larvae are extraordinarily susceptible to extraneous interference, and, if disturbed, often refuse to feed, so that domestication, as practised in the case of *Attacus ricini* (eri silk worms) and *Bombyx mori* is not practicable. After the larvae have completed the outer covering of their nest, they enter a quiescent pre-pupal stage that lasts on an average 111 days. The adults emerge principally during May, and, although the generations may overlap, there is only one in a year.

Anaphe spp. are parasitised in all stages. Many parasites found in Nigeria have not yet been identified, but those determined include the Tachinids, *Sturmia inconspicua*, Meig., and *Eutachina xanthaspis*, Wied., from pupae of *A. infracta* and *E. moloneyi*, and *Sericophoromyia ruficrura*, Vill., from pupae of *A. venata*; the Ichneumonids, *Oneilella contacta*, Wat. & Turn., var., and *Camptotypus vipiodes*, Brullé, from pupae of *A. venata*, and *Oneilella* spp. bred from *E. moloneyi* and *A. infracta*; and the Chalcids, *Haltichella* spp., from pupae of *A. infracta*, *A. ambrizzia* and *E. moloneyi*. The percentage of parasitism

may be high, but varies with the locality. Most of the Dipterous parasites emerge before the moths, and by keeping the cocoons in screened boxes the parasites are retained and die within a few days. Most of the Hymenoptera emerge at the same time as the moths. Predators include the Pentatomid, *Damarius splendidulus*, F., which preys upon the very small larvae and disturbs and scatters the colonies.

E. moloneyi in the Southern Provinces seems to feed only on *Albizzia fastigiata* and *A. brownei*. As these trees grow very slowly in the early stages, and the moths tend to remain on one tree and reproduce there year after year, this species cannot be semi-domesticated profitably. *A. venata* appears to feed exclusively on *Triplochiton johnsonii* and *T. nigericum*, and as the larvae descend the tree and spin on adjacent growth, it is very doubtful whether an attempt to establish the tree on plantation lines would result in any appreciable increase. *A. ambrizzia* is found on a species of *Bridelia* as yet undetermined, which grows extensively in the orchard bush country. This country is constantly swept by fires in the dry season, but if belts were cleared to prevent the spread of fire the trees might be appreciably increased. They grow very rapidly and are hardy, and the colonies usually pass from one tree to another without entirely defoliating them.

B. micrantha is apparently the exclusive food-plant of *A. infracta*, and is widely distributed throughout Nigeria, thriving particularly well at the edges of the rain forests. This is a Euphorbiaceous quick-growing shrub, which can be propagated best from seed, the percentage of germination being very high. Experiments are being made on a large scale to ascertain the best conditions for plantation growth. As the trees are often found among abundant secondary growth, which is frequently very dense, the time and labour employed in gaining access to them raises considerably the price of the silk. The moths do not migrate to any distance, and it is therefore thought that after a preliminary clearing the trees might be consolidated under natural conditions with regard to locality and environment, so that the silk could be produced as a commercial undertaking, provided that factors such as parasitic control are regulated. The larvae never completely defoliate any individual tree, and the recovery of the trees from defoliation is very rapid.

The fibre obtained from nests of *A. infracta* is superior to that of any other species of *Anaphe* in strength, durability and freedom from foreign matter, and, apart from the initial labour of planting the trees and gathering the nests, only the minor task of cleaning remains to be done. It is suggested that production might be increased by exploiting areas that already contain considerable quantities of unused silk, by educating the native to conserve the natural resources, and by carefully introducing a system of semi-domestication by planting trees in favourable areas and keeping them restocked.

MYERS (J. G.) & ATKINSON (E.). **The Relation of Birds to Agriculture in New Zealand. V. The Kingfisher, the Cuckoos and the Parrots.** —*N.Z. Jl. Agric.*, xxvii, no. 4, pp. 227–234. Wellington, 20th October 1923.

The kingfisher (*Sauropatis sanctus*) is considered to be a distinctly beneficial bird owing to its insectivorous habits. The various species of cuckoos and parrots are discussed, some only being insect-eaters.

TILLYARD (R. J.). **The Parasite of the Woolly Aphis in New Zealand. Progress of the Work of distributing** *Aphelinus mali* **during the Season 1922-3.**—8 pp., sine loco [1923]. [Received 18th December 1923.]

The work in connection with the distribution of *Aphelinus mali*, Hald., the parasite of the woolly aphis [*Eriosoma lanigerum*, Hausm.], in New Zealand [*R.A.E.*, A, x, 575] has been continued and a full account is given of the operations carried out during the spring and summer of 1922–23. Individual fruit growers are urged to supply their friends with the parasite. This may be done by saving the prunings on which the dead bodies of the woolly aphis are to be seen, and these twigs can be despatched by post during the winter, provided that they are wrapped in soft tissue paper inside a small box. Consignments of such twigs are also being sent to applicants in Australia.

The adults of *A. mali* are not affected by sprays, nor are the pupae, but oil, tobacco and soap sprays used against *E. lanigerum* will kill the larvae. Sprays against the woolly aphis should be omitted wherever the parasites occur, but other routine sprays (lead arsenate, fungicides, etc.) may be continued. Early oil spraying for red spiders may still be carried out, as the parasites are not then in the larval stage.

RÉGNIER (R.). **Modèles nouveaux de boîtes d'élevage et d'exposition entomologique.**—*Rev. Hist. nat. appl.*, 1ère partie, iv, no 11, pp. 336–344, 4 figs. Paris, November 1923.

Several boxes suitable for the rearing of small insects on their food-plants are described and illustrated, and also others designed to exhibit living insects as nearly as possible under natural conditions.

MACDOUGALL (R. S.). **Insect and Arachnid Pests of 1921.**—Separate from *Trans. Highland & Agric. Soc. Scotland*, 39 pp., 46 figs. [Edinburgh] 1922. [Received 21st December 1923.]

The beneficial insects recorded were the predators, *Cicindela campestris* (tiger beetle), the Carabids, *Harpalus ruficornis* and *Calosoma sycophanta*, and the Staphylinid, *Ocypus olens*. The pests included :— the Lamellicorns, *Trichius fasciatus* and *Sinodendron cylindricum*, which live in decaying branches of trees ; the beehive pest, *Meloë violaceus* ; *Dermestes lardarius* (bacon or larder beetle) ; *Rhyacionia* (*Retinia*) *resinella* (pine resin-gall tortrix), *Enarmonia diniana*, feeding on larch ; *Argyresthia atmoriella* (larch shoot moth) and *Bupalus piniarius* (pine geometer) of which brief life-histories are given ; the Cecidomyiid, *Oligotrophus taxi* ; several species of Vespids (social wasps), the social life of which is described ; *Sirex gigas* and other Siricids (wood wasps), which live in felled or decaying timber and may pass to standing trees ; *Chermes cooleyi*, found on Douglas fir ; *Eriosoma lanigerum* (woolly apple aphis), of which the life-history and treatment is discussed ; and *Trialeurodes* (*Asterochiton*) *vaporariorum* (greenhouse whitefly) for which Lloyd's treatment is recommended [*R.A.E.*, A, viii, 474].

Macdougall (R. S.). **Insect and other Pests of 1922.**—Separate from *Trans. Highland & Agric. Soc. Scotland*, 43 pp., 44 figs. [Edinburgh] 1923. [Received 21st December 1923.]

The pests include *Acarapis woodi*, causing Isle of Wight disease of bees, *Eriophyes ribis*, on black currant, *E. fraxini*, on ash, *Pieris brassicae*, *P. rapae* and *P. napi*, on various crucifers, *Smerinthus populi*, on poplar, willow and some garden plants, *Zeuzera pyrina* (*aesculi*) (wood leopard moth), which deposits eggs on a number of different broad-leaved trees, the larvae tunnelling into the wood and pupating under the bark, *Agrotis* (*Triphaena*) *pronuba*, *Leucoptera* (*Cemiostoma*) *laburnella*, mining the leaves of laburnum, *Megachile* sp., in rotten wood, *Pteronus* (*Nematus*) *ribesii*, *Chermes* (*Gillettea*) *cooleyi*, on spruce (*Picea*) and Douglas fir, *C.* (*Dreyfusia*) *nüsslini*, on silver fir (*Abies pectinata*) and *Picea orientalis*, *Phytomyza ilicis*, on holly, *P. geniculata*, on *Chrysanthemum* and *Cineraria*, *P. flavicornis*, in leaf-stalks of swedes, and *Oscinella* (*Oscinis*) *frit*, on oats.

Endrosis lacteella and *Borkhausenia pseudospretella* were found eating into corks of bottled wines and causing them to leak. *E. lacteella* is found all over Britain in houses, where the larvae normally feed on rubbish and refuse. *B. pseudospretella* is also distributed over Britain, the larvae feeding on dry plant and animal matter. A general life-history is given of *Bombus* spp., together with some characteristics that distinguish them from *Psithyrus* spp.

Navas (L.). **Medios naturales de defensa contra la langosta.** [Natural Means of Defence against Locusts.]—*Rev. Acad. Ciencias Zaragoza*, vii (1922), pp. 94–118, 5 figs. Saragossa, 1923.

Among the means here enumerated by which locusts are destroyed are the growing of plants unsuitable as food for them (such as *Glycine hispida* (*soja*) in China) or poisonous to them (such as *Ricinus comunis* in Australia), fungous enemies, and bacillary infections (such as *Coccobacillus acridiorum*).

Kleine (R.). **Die Bedeutung der Meteorologie für die Bekämpfung der Schadeinsekten.** [The Importance of Meteorology in combating Injurious Insects.]—*Zeitsch. wiss. Insektenbiol.*, xviii, no. 12, pp. 328–335. Berlin, 15th December 1923.

The view is expressed that observation of the weather conditions in winter and early spring will enable effective measures to be taken against insect pests. Some data relating to this subject in connection with the beet fly, *Pegomyia hyoscyami*, are given here. This pest has three generations a year, the first lasting 30 days on an average, the second 35–45, and the third 75–85, with a few stragglers that require even longer. The fly needs a certain amount of warmth in order to leave the overwintering pupa. It is not so much a matter of the air temperature on individual days as one of a general temperature sufficient to permit the ground to store up heat. Such storage to a depth of about 3 feet is effected gradually, and even after a hard winter it can be effected by clear, sunny weather in early spring. Once the insect has left the ground, air temperatures alone influence it. High ground temperature may promote rapid emergence, after which a cold air temperature may

prevent normal development. This is what actually occurred with *P. hyoscyami* in the observations recorded. In spite of favourable ground temperatures, infestation was slight because the heavy rainfall, cold air temperatures and strong winds hindered further development.

SAALAS (U.). **Studien über die Elateriden Finnlands. I.** *Corymbites cupreus* **Fabr. subsp.** *aeruginosus* **Fabr. und seine Verheerungen, besonders in der Gegend von Kainuu.** [Studies on the Elaterids of Finland. I. *C. cupreus*, F., subsp. *aeruginosus*, F., and its Outbreaks, especially at Kainuu.]—*Ann. Soc. zool.-bot. Fennicae Vanamo*, ii, no. 2, pp. 121–168, 2 figs, 2 maps. Helsingfors, 1923.

This is the first of a series of studies on the Elaterid beetles of Finland, where wireworms are serious pests. *Corymbites cupreus aeruginosus*, F., is one of the most harmful. Its larva is described and a note on its distribution in Finland and other countries is given. The chief flight occurs about the second half of June, and pupation probably takes place after the end of July, the adults emerging in autumn, but hibernating in the ground until the following spring. The district where the author's investigations were made is very barren. Barley is the cereal most commonly grown, and then rye. Like other Elaterids, *C. cupreus aeruginosus* is very polyphagous in the larval stage. The nature of the soil seems more important than the variety of plant as regards the occurrence of the pest. It is chiefly met with in clay and sandy soils containing humus. Marshy and entirely sandy soils were almost free from it. Most of the larvae occurred in fields with old, dry grass and in such ground newly ploughed and sown with barley and oats. If the larval stage of *C. cupreus aeruginosus* lasts 3–4 years (as with other Elaterids), this explains why the injury is most marked during the first two years after grassland has been brought under cultivation. It is hoped that with the extension and intensification of cultivation this very serious pest will decrease.

URBAN (C.). **Die Nahrungspflanzen der Apionen.** [The Food-plants of *Apion*.]—*Ent. Blätter*, xix, no. 4, pp. 171–176. Berlin, 31st December 1923.

The food-plants of about 160 species of *Apion* are listed in this paper.

ADRIANOV (A.). **Инструкция для наблюдений по биологии лугового мотылька.** [Instructions for making Observations on the Biology of *Loxostege sticticalis*, L.]—**Бюллетень постоянного Бюро Всероссийских Энтомо-фитопатологических Съездов** [*Bull. Perm. Bur. All-Russ. Ent.-Phytopat. Conf.*], no. 2, pp. 18–21. Petrograd, 1st August 1921. [Received 27th December 1923.]

A programme is outlined of points to be observed in studying the biology of *Loxostege sticticalis*, L., such as the general meteorological conditions characterising the winter; the beginning of spring activities; the flight of adults of the first generation; and the number of generations in the year. Remedial measures are briefly described and include cultural methods, protective trenches and insecticides.

Pukhov (B. A.). **Защита сельско-хозяйственных растений от вредителей в связи с поднятием производительных сил земледелия в Сибири.** [Protection of Agricultural Plants from Pests in connection with the raising of the Productive Powers of Agriculture in Siberia.]—**Бюллетень постоянного Бюро Всероссийских Энтомо-фитопатологических Съездов** [*Bull. Perm. Bur. All-Russ. Ent.-Phytopat. Conf.*], no. 3, pp. 3–10. Petrograd, 1st December 1921. [Received 27th December 1923.]

The size of the country is one of the great obstacles encountered in attempting to prevent injury by insects to grain crops in Siberia, where an enormous amount of damage occurred in 1920, particularly as the result of locust invasions. The importance of having a sufficient supply of poison and the need for organised co-operation in the application of remedial measures are pointed out.

Dankov (A.). **Об организации в России срочной практической службы статики, динамики и предвидения вредителей.** [On the Organisation in Russia of a temporary practical Service of Statics, Dynamics and Prediction of Pests.]—**Бюллетень постоянного Бюро Всероссийских Энтомо-фитопатологических Съездов** [*Bull. Perm. Bur. All-Russ. Ent.-Phytopat. Conf.*], no. 3, pp. 17–18. Petrograd, 1st December 1921. [Received 27th December 1923.]

The need for the establishment of an organisation in Russia that will predict the occurrence of insect pests so that remedial and preventive measures may be judiciously applied is pointed out. Such an organisation would have to be in close touch with a physical observatory.

Adrianov (A. P.). **Распространение вредных в сельском хозяйстве саранчевых за последние годы.** [Distribution of Locusts injurious to Agriculture during recent Years.]—**Бюллетень постоянного Бюро Всероссийских Энтомо-фитопатологических Съездов** [*Bull. Perm. Bur. All-Russ. Ent.-Phytopat. Conf.*], no. 3, pp. 19–23. Petrograd, 1st December 1921. [Received 27th December 1923.]

A brief statistical review is given of the outbreaks of various locusts and grasshoppers in Russia in 1920 and 1921. The Asiatic locust [*Locusta migratoria*, L.] appeared in 1920 as far north as the Tambov province, while in 1921 it was recorded as damaging crops in the Voronezh and Bryansk provinces.

Pospelov (V. P.). **Опытное дело и прикладная энтомология.** [Experimental Work and Applied Entomology.]—**Бюллетень постоянного Бюро Всероссийских Энтомо-фитопатологических Съездов** [*Bull. Perm. Bur. All-Russ. Ent.-Phytopat. Conf.*], no. 3, pp. 24–32. Petrograd, 1st December 1921. [Received 27th December 1923.]

The importance of co-operation among such workers as agronomists, entomologists and phytopathologists is discussed, and various problems arising during investigations on some of the important insect pests, such as the irregular occurrence of a second generation of *Loxostege* (*Phlyctaenodes*) *sticticalis* in Russia, are pointed out in order to show the essential interrelation of these branches of science.

Shtchegolev (V.). **Краткий обзор вредителей Череповецкой губернии за 1920-21 гг.** [Brief Report of Pests in the Tcherepovetz Province for 1920–21.]—**Бюллетень 3-го Всероссийского Энтомо-фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russ. Ent.-Phytopat. Conf. Petrograd 18th–25th December 1921*], no. 3, pp. 13–17. Petrograd, 20th December 1921. [Received 27th December 1923.]

In the Province of Tcherepovetz fruit is not grown to any large extent, and except for *Cydia* (*Carpocapsa*) *pomonella*, L., the damage caused by orchard pests appears to be comparatively slight. *Phyllobius* sp. was abundant on raspberries during April. Forests occupy 70 per cent. of the total area of the province, and the conditions subsequent to the war proved ideal for the development of various insect pests, the more important of which are *Ips typographus*, L., *Pityogenes chalcographus*, L, and *Ips proximus*, Eich., in pine, and *Scolytus*(*Eccoptogaster*) *ratzeburgi*, Jans., in young birch. Other forest pests are *Hyponomeuta* (*Yponomeuta*) *euonymellus*, L., *Lophyrus* sp., *Coleophora laricella*, Hb., *Agelastica alni*., L., and *Aporia crataegi*, L. The vegetable pests include the cabbage fly [*Phorbia brassicae*, Bch.], the flea-beetle, *Phyllotreta undulata*, Kutsch., the cabbage butterfly [*Pieris brassicae*, L.], *P. rapae*, L., *Grapholitha* sp., *Meligethes aeneus*, L., and *Phaedon* sp. *Apion* sp. caused slight injury to clover, and *Cecidomyia* sp. was found on timothy grass [*Phleum pratense*].

The pests of grain crops are the Noctuid [*Euxoa segetum*, Schiff.] ; the Swedish fly [*Oscinella frit*, L.] on oats and barley ; and the Hessian fly [*Mayetiola destructor*, Say].

Koblova (F. V.). **Отчет о деятельности Орловской Станции Защиты Растений от вредителей за 1920-21 гг.** [Report on the Activities of the Orlov Station of Protection of Plants from Pests for 1920–21.]—**Бюллетень 3-го Всероссийского Энтомо-Фитопатологического Съезда в Петрограде 18-25 декабря 1921 г.** [*Bull. 3rd All-Russ. Ent.-Phytopat. Conf. Petrograd 18th-25th December* 1921], no. 3, pp. 17–24. Petrograd, 20th December 1921. [Received 27th December 1923.]

The general organisation, equipment and activities of the Station are briefly described, and a list of the insect pests recorded in the Orlov Province is appended.

Skorikov (A. S.). **Шмели Палеарктики. Часть I. Общая Биология (со включением зоогеографии).** [Bumble-bees of the Palaearctic Regions. Part I. General Biology (including Zoo-geography).]—**Извест. Северной Областн. Станц. Защиты Растений от Вредителей** [*Bull. Northern Regional Sta. Plant Protect.*], iv (1921), pt. 1, pp. 1–160, 17 maps, 11 figs. Petersburg, November 1922. [Received 27th December 1923.]

The results of the author's extensive observations on the Bombids of the Palaearctic Region are to be published in two independent parts, the first of which is here noticed and deals with the biology of these insects in the broad sense and their distribution ; their value in rural economy is discussed and a list is given of the known species of the world.

Faunae Petropolitanae Catalogus.—**Петроградс. Агр. Инст. Научно-Исследов. Отдел, Энт. Станц.** [*Petrograd Agron. Inst., Sci. Res. Dept., Ent. Sta.*], Ser. C, nos. 7, 9, 10, 11 & 13; 11, 6, 16, 51 & 21 pp. Petersburg, 1921–1922. [Received 27th December 1923.]

The contributions to the fauna of the Petrograd province [*R. A. E.*, A, x, 37] here noticed belong to volume II and are: no. 7 Free-living Nematodes by N. Filipev; no. 9 MUTILLIDAE by V. V. Barovski; no. 10 Diptera Nematocera by A. A. Shtakelberg; no. 11 Bumble-bees by A. S. Skorikov; and no. 13 ASILIDAE by A. A. Shtakelberg.

FILIPEV (I. N.). **Инструкция для собирания свободных нематод.** [Instructions for the Collection of Free Nematodes.]—**Петроградс. Агр. Инст. Научно-Исследоват. Отдел. Энт. Станц.** [*Petrograd Agron. Inst., Sci. Res. Dept., Ent. Sta.*], Ser. B, no. 3, 14 pp. Petrograd, 1922. [Received 27th December 1923.]

Instructions are given for the collection of terrestrial and aquatic nematodes and the preparation of specimens.

KIRITCHENKO (A. N.). **Инструкция для собирания полужесткокрылых насекомых (Hemiptera-Heteroptera) и исследования местных фаун.** [Instructions for the Collection of Heteropterous Rhynchota and Investigations of Local Fauna.]—**Петроградс. С.Х. Инст. Энт. Станц.** [*Petrograd Agric. Inst. Ent. Sta.*], Ser. B., no. 4, 46 pp., 4 figs. Petrograd, 1923. [Received 27th December 1923.]

The contents of this paper on the collection of Rhynchota are indicated by its title.

SEVASTYANOV (I.). **Саранча в Туркестане и борьба с ней.** [Locusts in Turkestan and their Control.]—**Туркглавполитпросвет, С.Х. серия** [*Turkestan Political Education Dept., Agric. Ser.*], no. 3, 49 pp., 20 figs. Tashkent, 1923.

A popular account of locusts is given, with the usual recommendations for control.

Quarantine Proclamation, no. 117.—*Commonwealth Australia Gaz.*, no. 75, 1 p. Melbourne, 25th October 1923.

To prevent the spread of the pink bollworm (*Platyedra gossypiella*) from the north-western part of Western Australia into other parts of the Commonwealth, the removal is prohibited of cotton seed or lint from any part of Western Australia north of 26° S. Lat. into any other part of Australia, excepting the Northern Territory.

[**St. Vincent**] **Notice,** 1 p., 17th November 1923.

The importation into St. Vincent of second-hand jute bags is prohibited under the provisions of the Importation of Plants Diseases Prevention Ordinance, 1906.

Texas Pink Bollworm Regulations for the Crop Season of 1923.—*U.S. Dept Agric., Fed. Hortic. Bd.*, Service and Regulatory Announcements, no. 76, July-September 1923, pp. 99–102. Washington, D.C., November 1923.

These regulations, directed against the pink bollworm [*Platyedra gossypiella*, Saund.], governing the planting, growing and marketing of cotton produced in regulated zones in Texas and prescribing means of disinfecting the seed are dated 1st August 1923. All regulations formerly issued are repealed.

Amendment to Texas Pink Bollworm Regulations, 1st August 1923.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, Service and Regulatory Announcements, no. 76, July-September 1923, pp. 102–103. Washington, D.C., November 1923.

This amendment, dated 19th September 1923, deals with the crushing and hulling of cotton seed and the inspection of mills.

Modification of Louisiana Pink Bollworm Rules and Regulations.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, Service and Regulatory Announcements, no. 76, July-September 1923, pp. 103–104. Washington, D.C., November 1923.

The effect of these regulations regarding the interstate movement of cotton seed and products directed against the pink bollworm [*Platyedra gossypiella*, Saund.], and effective as from 1st August 1923, is to extend the Federal Quarantine and prohibit the entry into Louisiana of cotton seed and cotton seed products from a tier of counties surrounding each of the regulated zones in Texas. Entry of such products from New Mexico into Louisiana is prohibited.

Japanese Beetle Quarantine. Restrictions on the Interstate Shipment of Farm Products under the Japanese Beetle Quarantine removed.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, Service and Regulatory Announcements, no. 76, July-September 1923, p. 106. Washington, D.C., November 1923.

The Quarantine against the Japanese beetle [*Popillia japonica*, Newm.] [*R. A. E.*, A, xi, 426] is not to be enforced from 16th September 1923 to 15th June 1924, as the beetle is not active during this period.

Amendment no. 2 to Regulations Supplementary to Notice of Quarantine no. 41 (Revised).—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp., typescript. Washington, D.C., 30th November 1923.

This amendment to the precautions against the introduction of *Pyrausta nubilalis* supersedes Amendment no. 1 [*R. A. E.*, A, xi, 496], provides for better baling of imported broom corn, limits the entry of unmanufactured broom corn at New York from 1st November to 31st January, and reduces the period for sterilisation (by steam) from 40 to 30 days. It became effective on 30th November 1923.

Comstock (J. H.). **An Introduction to Entomology. Part I—The Structure and Metamorphosis of Insects.**—2nd Edn., 8vo, xix+220 pp., 220 figs. Ithaca, N.Y., The Comstock Pubg. Co., 1920. [Received 27th December 1923.]

This edition, which has been entirely re-written, incorporates much of the data included in earlier works by the author, notably that in the original edition of this text-book, issued in 1888, and long out of print. The titles of the four chapters are as follows: The Characteristics of Insects and their near Relatives; the External Anatomy of Insects; the Internal Anatomy of Insects; and the Metamorphosis of Insects. The bibliography, arranged by authors, occupies seven pages and most of the illustrations are newly drawn.

Willey (C. R.). **Treatment of Seed Corn with Tar and Paris Green as a Protection from Wireworms.**—*Qtrly. Bull. Virginia State Crop Pest Commiss.*, v, no. 2, 3 pp. Blacksburg, Va., July 1923. [Received 27th December 1923.]

Tests have now been made to determine the effect on germination of coating maize seed with tar just before planting as a protection from attack by wireworms. The results indicate that germination of the seed was not affected by treatment, three weeks before planting, with tar and raw linseed oil in equal parts or in the proportion of 1 : 2, either with or without the addition of a dust consisting of 1 part of Paris green with 9 parts of carefully sifted road dust. A trial of this treatment is recommended where maize is to follow grass and wireworms are abundant.

Geise (F. W.), Zimmerley (H. H.) & Spencer (H.). **Spraying and Dusting Vegetable Crops in 1922.**—*Virginia Truck Expt. Sta.*, Bull. 41, pp. 237–256, 9 figs. Norfolk, Va., 1st October 1922. [Received 27th December 1923.]

The experiments in dusting vegetable crops previously described [*R. A. E.*, A, x, 559] have been continued in 1922, chiefly from the point of view of fungus control. On egg-plants a dust, composed of 16 per cent. dehydrated copper sulphate, 20 per cent. calcium arsenate and 64 per cent. hydrated lime, and a spray of Bordeaux mixture 4 : 6 : 50, with 2 lb. powdered calcium arsenate, reduced injury from the flea-beetles, *Epitrix parvula* and *E. cucumeris*, to one-half, besides being successful against fungous disease. A trailer for the power duster was designed for the application of dusts during windy weather to egg-plants and other tall crops, and is described and illustrated. Two heavy applications of 3 per cent. nicotine dust proved successful as a repellent against *Diabrotica vittata*, F., and *D. duodecimpunctata*, Oliv., on young cantaloups and cucumbers, and also controlled *Thrips tabaci*. Springtails (*Smynthurus* sp.) are usually serious pests of young cucumber plants. Dry ground fish scrap, applied at the rate of 200 lb. to the acre so as to cover the plants, repelled them and was also beneficial as a fertiliser. The treatment was so successful that it is recommended for general routine use.

ZIMMERLEY (H. H.) & SPENCER (H.). **Hot Water Treatment for Nematode Control.**—*Virginia Truck Expt. Sta.*, Bull. 43, pp. 267–278, 6 figs. Norfolk, Va., 1st April 1923. [Received 27th December 1923.]

In Virginia, where a considerable acreage of vegetables is grown in greenhouses during the cooler months, much damage by nematodes has occurred, particularly to tomatos and cucumbers grown to maturity in greenhouses. Various remedies have been tried during the last 10 years, including formaldehyde, calcium cyanide, sodium cyanide, and carbon bisulphide, all of which, although applied in large amounts and under very favourable conditions, were ineffective. Experiments in 1920 [*R. A. E.*, A, vii, 323] showed hot water treatment to be effective against nematodes in pots of soil or on a small scale on greenhouse benches. This method has now been tried on a larger scale in greenhouses where nematode infestation was known to extend to a depth of 24 in. The soil in the beds was warm and dry and was spaded thoroughly down to the subsoil, and enough was removed to leave the surface 3 in. below the cement curbing. Two wooden covers were made, stretching from curb to curb and about 10 ft. wide, and the ends of the bed were closed by temporary wooden partitions. The hot water was carried by a pipe through a hole in the cover. The water varied in temperature between 200° and 212° F. After treatment the covers were shifted, and the hot soil covered with canvas or burlap. The treated soil from top to bottom quickly reached a temperature exceeding the theoretical death point of 120° F. by several degrees, and the temperature remained above this point for 9 to 48 hours. Cucumbers planted in potted soil taken from these beds were perfectly healthy a month later, while those in untreated soil were heavily infested. A satisfactory crop of tomatos was produced in the beds as soon as they had dried sufficiently. Where as much as 5 U.S. gals. of boiling water to a cubic foot of soil was used, the nematodes were reduced to a minimum ; with less than this, the nematodes were again active after several months. Care should be taken to have sufficient subsoil drainage to remove excess of water. Similar treatments for cold frames and hot-beds and for potting soil are described.

Work against Gipsy and Brown-tail Moths.—*Ann. Rept. Massachusetts Commiss. Conserv. & State Forester 1922*, pp. 46–49. Boston, Mass., 1923. [Received 27th December 1923.]

Both gipsy moth [*Porthetria dispar*, L.] and brown-tail moth [*Nygmia phaeorrhoea*, Don.] have caused less severe infestations in many localities than was expected, largely owing to the vigilance of the winter workers. An account is given of the Federal work against the former pest during the year. Parasites were obtained from Japan [*R. A. E.*, A, xi, 37], and although most of them arrived in very poor condition, a further generation has been bred from them, and a few test colonies have been liberated in the field. Parasites were not sufficiently numerous in Germany to enable shipments to be made to America, but it is thought that more hardy natural enemies will be obtained from there than from southern Europe.

Report of the Division of Plant Pest Control.—*Ann. Rept. Massachusetts Dept. Agric. 1922*, pp. 73–81. Boston [1923]. [Received 27th December 1923.]

The work of Apiary and Nursery Inspection is described. The satin moth [*Stilpnotia salicis*] was found in a few instances, and should be treated with lead arsenate sprays at the time the young caterpillars start feeding. As it hibernates as a small larva in crevices of the bark, there is danger of its introduction on nursery stock in spring or autumn. A State quarantine has been passed on willows and poplars, with the provision that they may be exported from the infested area to other points within the State under permit, such permits to be void after 1st May. The work against European corn borer [*Pyrausta nubilalis*, Hb.] has been curtailed through lack of funds. Two bills have been submitted to the Legislature, one recommending the policy by which work could be most efficiently carried on, and the other suggesting certain field methods, including compulsory ploughing of all maize stubble by 1st December. As there are two generations of the pest in Massachusetts, it is particularly dangerous in that State.

Vorhies (C. T.). **Entomology.**—*32nd Ann. Rept. Arizona Agric. Expt. Sta., 1920–21*, pp. 583–586. Tucson, Ariz., 31st December 1921. [Received 28th December 1923.]

The bollworm [*Thurberiphaga catalina*, Dyar] found on Arizona wild cotton (*Thurberia thespesioides*) has not yet been observed on cultivated cotton, but is potentially a dangerous insect. It is known that it can develop to larval maturity in the bolls of Pima cotton and an investigation is being made to determine whether it can adapt itself to cultivated cotton. Wheat seed was found to be injured by *Phorbia* (*Hylemyia*) *cilicrura*, Rd., which is a pest of many vegetable crops, but not of wheat. It is thought that the eggs or larvae were present in the soil when the seed was put in. An account of the work of the year in connection with bees is given.

Stahl (C. F.) U.S. Bur. Ent. & Carsner (E.). **A Discussion of *Eutettix tenella* Baker as a Carrier of Curly-top of Sugar Beets.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 476–479. Geneva, N.Y., December 1923.

Some of the more important points ascertained during investigations on *Eutettix tenella*, Baker, as the transmitting agent of curly-top disease of sugar-beets are given. The available evidence indicates that curly-top has been present in sugar-beet fields in the districts inhabited by this insect from the time the beets were first planted there. The ability to transmit the disease is acquired after emergence from the egg by feeding on a diseased plant. Uninfected individuals that have been allowed to feed on infected plants, even for 10 minutes only, are invariably able to transmit the disease. A short interval must elapse before the virus can be transmitted. Experimentally transmission has been effected after 15 hours. It has been observed that, for a certain period at least, a higher percentage of insects is able to produce the disease as the length of the interval between feeding and inoculation increases. The increase in number is greatest during the interval between 24 and 72 hours. A few minutes' feeding on the healthy plant is sufficient to inject the virus. The ability of producing the disease, once it has been acquired, is apparently never lost. It is

probable that hibernating adults might retain it throughout the winter. The nymphs do not lose the ability of producing the disease during the process of moulting, but there is apparently no evidence to support the theory that the nymph is more virulent than the adult.

Though experiments have been made with many other insects, a list of some of which is given, in no case was transmission successful. These tests are being continued.

SEVERIN (H. H. P.). **Investigations of Beet Leafhopper (*Eutettix tenella* Baker) in Salinas Valley of California.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 479–485. Geneva, N.Y., December 1923.

In the Salinas Valley annual salt bushes (*Atriplex* spp.) are scarce and *Eutettix tenella*, Baker, multiplies chiefly on sugar-beets. The nymphs were bred from eggs deposited in 17 weeds, a list of which is given, growing in the cultivated areas. There is no evidence of migration across the mountains [*cf. R.A.E.*, A, vi, 480]. During the autumn dispersal the overwintering adults fly to the foothills. Those leafhoppers that assemble on favourable food-plants during the spring flights remain in the cultivated foothill regions together with the later summer generations. The cultivated areas are not entirely free from leafhoppers during the winter, and if abundant, these individuals are a serious menace to early planted sugar-beet. In the upper Salinas Valley over half of the crop showed curly-leaf symptoms before the spring brood flew into the beet fields. During a dry autumn, when annual plants are mostly dry along roadsides, the number of nymphs can be greatly reduced by removing green vegetation along irrigation and drainage canals in beet fields.

Early planting of sugar-beets (December to February) is the only known practical method of preventing losses from curly-leaf in localities outside the fog belt. In the fog belt districts late planted beets make a better tonnage than early plantings in a normal season of rainfall. Planting should be discontinued from 1st March until after the spring dispersal [*cf. R.A.E.*, A, xi, 8].

DE ONG (E. R.). **The Relation between the Volatility and Toxicity of Nicotine in Sprays and Dusts.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 486–493. Geneva, N.Y., December 1923.

The following is the author's abstract of this paper: Free nicotine is very volatile, while nicotine sulphate is not volatile. The toxicity of nicotine solutions varies in proportion to their conversion from the salt form to the free alkaloid. The volatilisation curve of nicotine is almost an exact parallel of the curve of toxicity both of fumigation and spraying. Dust carriers follow this same law, *i.e.*, an inert material does not free the nicotine as does an active carrier, and, hence, is less efficient.

The following recommendations are made for the practical application of these considerations. In the case of nicotine sulphate sprays a slight excess of alkali should be added over the amount needed to combine with the sulphuric acid present. For 200 U.S. gals. of a 1 800 solution of nicotine sulphate, 6¾ oz. of lime would be required, if the nicotine solution had a specific gravity of 1·2. If soap is used as a spreader 3 oz. of sodium hydroxide or commercial lye or 4 oz. sodium carbonate should be added. Commercial soda ash is a convenient form for the latter.

Herbert (F. B.). **Spraying Equipment for Citrus Trees in California.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 494–497. Geneva, N.Y., December 1923.

The author has endeavoured to meet repeated requests from growers and county officers for data on spraying equipment for *Citrus* with special reference to the pressure desirable, size of gun discs, number of gallons required per tree, cost of application, etc., by compiling this paper from records of sprayers and general experience in the various districts in California.

Campbell (R. E.). U.S. Bur. Ent. **Notes on Nicotine Dust Progress.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 497–505. Geneva, N.Y., December 1923.

The following is the author's abstract of this paper : This general historical account of the use of nicotine in dusts is given with special reference to recent developments, the properties of carriers, the utilisation of finely ground tobacco dust, the comparative merits of free nicotine and nicotine sulphate, the advisability of a certain amount of moisture, the mechanical devices for the application of dusts, data on self-mixing dusters and the possibilities of local mixing. A bibliography of 50 papers is given.

Smith (H. S.). **What may we expect from Biological Control ?**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 506–511. Geneva, N.Y., December 1923.

The object of this paper is to bring about a better understanding as to the part that natural enemies should play in the general scheme of pest control. The following is the author's abstract : Biological control work has been subject to extremes of popular approval and disapproval. This is due to a lack of understanding, on the part of the general public, of just what results may reasonably be expected from this method. Success is dependent upon biological principles with which the grower is not always familiar. Some insect pests are favourable subjects for attack by this method and others are not. It is pointed out that the proper co-relation between host and parasite and freedom from secondary parasites are important factors in this type of control.

Armitage (H. M.). **The present Status of *Aphycus lounsburyi* How. in Southern California.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 511–516. Geneva, N.Y., December 1923.

Four years' observations on the work of *Aphycus lounsburyi*, How., as a parasite of the black scale [*Saissetia oleae*, Bern.] show that while it has become thoroughly established in California, it cannot be wholly relied upon for the control of its host. In the coastal (uneven-hatch) areas, where several generations occur both of the host and parasite, the value of the latter is reduced by hyperparasites, which in the order of their importance are : *Quaylea whittieri*, Gir. ; an undescribed species of *Eusemion* ; *Tetrastichus blepyri*, Ash. ; three species of *Cheiloneurus* ; *Eupelmus inyoensis*, Gir. ; and *Thysanus niger*, Ash.

Besides these a species of *Cheiloneurus*, one Eupelmine and *Perissopterus mexicanus*, How., have been found associated with *Aphycus*, though there is no proof that they are parasites of it. The hyperparasites are most abundant where the distribution of *A. lounsburyi* was most actively carried on; the latter has not, however, died out in these districts. Though under such conditions it is practically impossible for the parasite to control the scale alone, it is of unquestioned value as an aid to mechanical treatment.

The interior sections (even-hatch) have a much wider range of seasonal temperature and much lower humidity than the coastal sections and contain by far the larger citrus acreage in Southern California. There is only a single uniform generation of the scale, which limits the period of attack by *A. lounsburyi* to approximately two and a half months in the spring. In these areas this parasite is of great value in completing the sequence of enemies attacking the black scale, filling in the gap between the Coccinellid, *Rhizobius ventralis*, and *Scutellista cyanea*. With proper handling this sequence offers a possibility of control. *A. lounsburyi* materially increases the efficiency of *S. cyanea* by attacking the ovipositing adult scale and reducing the period of egg-laying, making it possible for *S. cyanea* to destroy all the eggs deposited. These two species are often found infesting one scale.

SMITH (H. S.). **The Successful Introduction and Establishment of the Ladybird, *Scymnus binaevatus* Mulsant, in California.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 516–518. Geneva, N.Y., December 1923.

After several attempts the Coccinellid, *Scymnus binaevatus*, Muls., has been successfully introduced into California from South Africa. It was colonised throughout the State on *Pseudococcus citri*, Risso, *P. gahani*, Green, and *P. maritimus*, Ehrh., and though up to the present it has only been recovered from *P. gahani*, it is believed that it will be of considerable value in the control of all three mealybugs, when it has had sufficient time to become thoroughly established.

WOGLUM (R. S.). **The History of Hydrocyanic Acid Gas Fumigation as an Index to Progress in Economic Entomology.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 518–521. Geneva, N.Y., December 1923.

The history of hydrocyanic acid gas fumigation since its discovery in 1886 is reviewed, with particular reference to progress in orchard fumigation.

DOANE (R. W.). **Bees vs. Spraying.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 527–531. Geneva, N.Y., December 1923.

The results recorded by W. A. Price [*R. A. E.*, A, ix, 296] on the serious effect of spraying with arsenicals on bees differ greatly from those obtained by the author in the same way at the same time. Details of these experiments are given, and show that spraying with arsenicals had no effect on the bees in California, though they were allowed to feed immediately after spraying. It is a common practice in the Santa Clara Valley to lease bees to fruit growers for the blossom period, and no restrictions are made as regards spraying. It is possible that the climate has something to do with these results.

Fullaway (D. T.). **Some Aspects of Biological Control in Hawaii.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 531–533. Geneva, N.Y., December 1923.

The biological method of dealing with insect pests has proved of great value in Hawaii, particularly as artificial remedial measures have generally given such poor results. The work of the introduced parasites is favoured by the fact that almost all the pests have been introduced and the climatic conditions that favour them also favour their parasites, and also by the character of the agriculture—comparatively few crops being grown over large areas under highly organised conditions.

Burroughs (A. M.). & Grube (W. M.). **A Simplified Method for making Lubricating Oil Emulsions.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 534–539. Geneva, N.Y., December 1923.

The following is the authors' abstract: A method is described by which stock emulsions of paraffin oils used in spraying are made without heat and without the use of potash fish-oil soap. Freshly made Bordeaux mixture or copperas-lime mixture, calcium caseinate, saponin and other substances were used as emulsifying agents in the place of soap. The oil, water and emulsifying agent were placed together in a container and pumped twice under fairly high pressure. The emulsions made in this way were used successfully on a large scale. They gave as good results against San José scale [*Aspidiotus perniciosus*, Comst.] as the emulsions made with potash fish-oil soap, and were cheaper and easier to prepare. These emulsions did not break down in the presence of hard water or water contaminated with lime or lime-sulphur.

Four of the most satisfactory formulae were :—

Engine oil 2 U.S. gals., tap water 1 U.S.gal., copper sulphate ¼ lb., or ferrous sulphate and quick lime ¼ lb. each ; engine oil 1 U.S. gal., tap water 1 U.S. gal., and copper sulphate ½ lb., or ferrous sulphate and quick lime ½ lb. each ; engine oil 2 U.S. gals., water 1 U.S. gal. and calcium caseinate 4 oz. ; engine oil 2 U.S. gals., water 1 U.S. gal., and saponin 4 oz. (or extract from ½ lb. soap bark).

Summers (J. N.). **A Refrigerator for shipping Live Insects.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 539–543, 2 figs. Geneva, N.Y., December 1923.

The successful importation of parasites depends upon proper refrigeration. On board ship this is obtained by placing the boxes containing the insects in the cold storage rooms, but the same facilities are not obtainable on land. A consignment of *Apanteles fulvipes* was, however, received in good condition from Japan by placing the boxes in the type of refrigerator used for the purpose of shipping ice cream. This species is a difficult one to ship over long distances as its cocoon stage only lasts about 6 days, so that proper refrigeration is absolutely necessary. The consignment in question was 18 days in transport (10 on the ship and 8 on land). The boxes were packed in Japan with parasitised larvae of the gipsy moth [*Porthetria dispar*] when the first parasite larvae were beginning to issue. Upon arrival it was found that they had issued from their host and spun their cocoons, but none of the adults had emerged. Shortly after arrival every cocoon produced a vigorous adult.

These refrigerators were also successfully tested for the transport of live larvae of *Hyphantria* sp. (web-worm), the journey occupying 7 days. The adaptation and construction of the refrigerators are described and illustrated.

WEBB (J. L.). U.S. Bur. Ent. **The Pink Bollworm of Thurberia,** *Thurberiphaga catalina.*—*Jl. Econ. Ent.*, xvi, no. 6, pp. 544–546. Geneva, N.Y., December 1923.

During 1918 C. H. T. Townsend went to Arizona for the purpose of studying *Thurberiphaga catalina*, Dyar (pink bollworm of Thurberia), and his report on these observations is here given.

Pupation occurs in the soil. From 142 larvae taken 41 Hymenopterous parasites were obtained, viz., *Microbracon* sp., *Perisierola* sp., *Apanteles thurberiae*, Muesebeck [*R. A. E.*, A, ix, 169] and one undetermined species. A list is also given of the other insects found on *Thurberia*.

HERRICK (G. W.). **Notes on the Biology of** *Desmocerus palliatus.*—*Jl. Econ. Ent.*, xvi, no. 6, pp. 546–548, 1 pl. Geneva, N.Y., December 1923.

The Cerambycid, *Desmocerus palliatus* (cloaked knotty horn beetle) is widely distributed in the United States, and also occurs in Canada. It attacks the common wild elder, *Sambucus canadensis*, and also golden elder, which is used for ornamental purposes. The larvae bore into the stems, partly above ground but mostly below. Many of the branches die as a result of infestation. In New York State the adults appear in June and feed to some extent on the leaves. The eggs have been found attached to leaves of the elder, though it is doubtful if this is normal. Pupation occurs in the burrows in spring.

The larvae might possibly be destroyed by paradichlorobenzene as applied against the peach tree borer [*Aegeria exitiosa*]. The application might be more effective if made during the latter half of April rather than in the autumn.

STEAR (J. R.). **Red Bug Control in Southern Pennsylvania.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 548–550. Geneva, N.Y., December 1923.

In Southern Pennsylvania *Lygidea mendax*, Reut. (false red bug) is responsible for a great deal of injury to apples. *Heterocordylus malinus*, Reut. (dark red bug) has so far not been collected or reared from apples at the Chambersburg laboratory. Nicotine sprays before the blossoms open were followed by varying results in Southern Pennsylvania, and experiments showed that a single careful application of nicotine at petal fall will give excellent control without an additional spray. With most varieties of apples the pink spray is too early to be of much value against *L. mendax*, as only a few of the eggs have hatched.

DE ONG (E. R.). *Habrobracon juglandis*, **Ashmead, as a Parasite of** *Plodia interpunctella*, **Hubn.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 550–551. Geneva, N.Y., December 1923.

Habrobracon juglandis, Ashm., is one of the most abundant and widely distributed of all parasites of *Plodia interpunctella*, Hb. (Indian meal

moth) in California. It was also found to breed on a recently introduced pest of peanuts, *Aphomia gularis*, Zell. The average development period of *P. interpunctella* in California is 53 days and that of *H. juglandis* 16, so that there is a possibility of a third and a partial fourth generation to one of the host. Oviposition habits are discussed. The total number of eggs laid by a single parasite ranged from 15 to 24.

KELLY (E. G.). **Note on the Cotton Boll Weevil in Kansas.**—*Jl. Econ. Ent.*, xvi, no. 6, p. 552. Geneva, N.Y., December 1923.

A number of adults and larvae of the cotton boll weevil [*Anthonomus grandis*, Boh.] were found on cotton in Southern Kansas (Montgomery County) in October 1923.

MCDANIEL (E.). **A Mealy Bug on Grape.**—*Jl. Econ. Ent.*, xvi, no. 6, p. 552. Geneva, N.Y., December 1923.

Pseudococcus maritimus, Ehr., was recorded from Michigan during the summer of 1923 as causing injury to grapes, which resulted in the premature dropping of the fruit.

SNAPP (O. I.). & ALDEN (C. H.). U.S. Bur. Ent. **The Effect of Low Temperatures on the San José Scale in Georgia.**—*Jl. Econ. Ent.*, xvi, no. 6, p. 552. Geneva, N.Y., December 1923.

During recent observations on *Aspidiotus perniciosus*, Comst., on peach trees in Georgia the percentage of dead scales on trees that had not been treated during the winter for the control of this pest increased from 12 to 38 as the result of unusually cold weather. The minimum temperatures recorded for a four-day period were 26°, 23°, 18° and 21° F. Some large female scales and all larvae were killed.

SMITH (M. R.). **Unusual Damage to the Floors of a House by a Species of Pemphredinid Wasp, *Stigmus fulvicornis*, Rohwer.**—*Jl. Econ. Ent.*, xvi, no. 6, pp. 553-554. Geneva, N.Y., December 1923.

Stigmus fulvicornis, Roh., is recorded from Mississippi as causing serious injury to floors by constructing nests in holes in the boards. The holes were undoubtedly made by the wasps. There is no previous record of any of the species of this genus having attacked furniture or floors; they generally breed in the stems of plants or twigs of trees. It is suggested that carbon bisulphide should be injected into each hole, and that the floor should be painted or varnished two days afterwards.

DETWILER (J. D.). **Three little-known Clover Insects: the Clover-head Weevil (*Phytonomus meles*, Fab.), the lesser Clover-leaf Weevil (*P. nigrirostris*, Fab.) and the Clover-seed Weevil (*Tychius picirostris*, Fab.).**—*Cornell Univ. Agric. Expt. Sta.*, Bull. 420, 28 pp., 23 figs. Ithaca, N.Y., May 1923. [Received 31st December 1923.]

Further work has been done on these three pests of red clover [*R. A. E.*, A, vii, 283] and the details of their life-histories in New York State. *Hypera* (*Phytonomus*) *meles*, F. (clover-head weevil), which

is not yet well established, hibernates as an adult and oviposits in the stems and petioles of red clover leaves in May. The larval period occupies about 23 days; the adults begin to appear early in July, and in late July eggs are found on the second growth of clover. In late August ovipositing beetles were collected, eggs being found as late as 15th September; there is therefore evidently at least a partial third generation. Observations indicate that there is a very effective natural check which is probably a fungous disease. Direct parasites, probably Ichneumonids, have been recorded by other workers, and a species of *Microbracon*, parasitic on *H.* (*P.*) *nigrirostris*, probably attacks *H. meles* also. Should the latter become a serious pest, its numbers might probably be greatly reduced by cutting the clover a little early.

H. nigrirostris, F. (lesser clover-leaf weevil) has a very similar life-history. The eggs are laid in late April under the epidermis of the leaves and hatch in about 18 days; allowing 23 days for the larval period and 8 days for pupation, adults would appear in the first half of June. There is a partial third generation, eggs being found as late as 7th October. As in the case of *H. meles*, several species of clover act as food-plants, as well as lucerne. While very little damage is done to the forage crop by *H. meles*, *H. nigrirostris* occasionally endangers it. If a second crop of clover were grown for seed, considerable injury might be done by the second generation of either species. The Ichneumonid parasite, *Bathyplectes exigua*, Grav., which has at least two generations in a season, is rather abundant and attacks the larval stage of *H. nigrirostris*, pupating in the host cocoon. The species of *Microbracon* referred to above seems to be also an important factor in control. Other workers have recorded *Anisia* sp. and *Bracon* sp. as larval parasites, while the pupae are said to be destroyed by the fungus, *Empusa sphaerosperma*.

Tychius picirostris, F. (clover-seed weevil) hibernates as an adult in the field where it has been feeding, and as soon as the clover heads begin to turn purple oviposition begins, the eggs being laid on the ovary of the floret. They hatch in from 7 to 9 days; the active larval period lasts from 11 to 18 days; the prepupal period from 8 to 11; the pupal from 13 to 15; and emergence 7 days; the total life-cycle requiring from 46 to 62. Reproduction continues practically throughout the summer. Assuming that oviposition has begun in the first week of June, a new generation should begin to appear about mid-July. Infestation in old fields was found to be distinctly heavier than in new ones. Early cutting is not recommended when the second crop is to be harvested for seed, for the larvae decrease in numbers as the season advances, but for the first crop it might prove advantageous, though the actual damage to this crop is generally negligible.

Winston (J. R.), Bowman (J. J.) & Yothers (W. W.). **Bordeaux-Oil Emulsion.**—*U.S. Dept. Agric.*, Dept. Bull. 1178, 22 pp., 3 figs. Washington, D.C., 21st November 1923.

As a result of extensive laboratory and field tests, which are described, it has been demonstrated that Bordeaux-oil emulsion, which is a mixture of Bordeaux mixture 3 : 3 : 50 and 1 per cent. of oil ($\frac{1}{2}$ per cent. for trees in bloom), in the form of an emulsion, is a promising spray material for use on *Citrus* in Florida. The Bordeaux part of the mixture is as effective against fungi as is Bordeaux mixture alone, and the same may be said of the oil emulsion part as applied to insects. The oil

emulsion (2 U.S. gals. paraffin oil, 1 U.S. gal. water, 2 lb. caustic potash fish-oil soap) should be poured slowly into 200 U.S. gals. Bordeaux mixture and stirred constantly. As the Bordeaux mixture has the effect of preventing the development of entomogenous fungi, and as the fungicidal effect of the combined spray outlasts the insecticidal, Coccids and Aleurodids are apt to increase more than after an application of plain oil emulsion, and in this case a thorough application of oil emulsion alone should be given. The sulphur treatment for rust mites [*Phyllocoptes oleivorus*] should also be given a little earlier than usual, as the mites usually reach their maximum number a week or two sooner on trees sprayed with Bordeaux-oil emulsion than on unsprayed trees.

Chittenden (F. H.). U.S. Bur. Ent. **Note on** *Ogdoconta cinereola*, **Guen.**—*Bull. Brooklyn Ent. Soc.*, xviii, no. 5, pp. 155-156, 1 fig. Brooklyn, N.Y., December 1923.

It is pointed out that *Ogdoconta cinereola*, Guen., has been wrongly designated in the past as "bean cutworm," since it is neither a cutworm nor, to any extent, injurious to beans. It infests the Jerusalem artichoke (*Helianthus tuberosus*) and the sunflower (*H. annuus*), the larvae eating holes in the foliage. Moths were found in July in the District of Columbia, from which a second generation would develop, and there is probably a third generation in nature. The name "striped artichoke caterpillar" is suggested for it. The Sarcophagid, *Cuphocera ruficauda*, Wied., is the only parasite recorded from it.

Perronne (R.). **Sur la culture du Pyrèthre de Dalmatie.**—*Rev. agric. Afr. Nord*, xxi, no. 229, pp. 811-815. Algiers, 21st December 1923.

This is a reproduction of an article previously noticed [*R.A.E.*, A, x, 209], with an additional note regarding the best method of cultivating pyrethrum under Algerian conditions.

Cros (A.). **Le** *Leptopalpus rostratus* **Fabr. Ses moeurs, sa larve primaire.**—*Bull. Soc. Hist. nat. Afr. Nord*, xiv, no. 8, pp. 327-337, 1 pl. Algiers, 1923.

Leptopalpus rostratus, F., occurs in Spain and Algeria. The primary larva is described and the habits of the adult insects are discussed. They are mostly found feeding on the pollen of *Centaurea pullata*, and oviposit on the flowers. Though the habits of the larvae are still unknown, they are undoubtedly parasites of honey-producing Hymenoptera such as *Eucera* or others, attaching themselves to the adults when they visit the flowers and being carried to their nests.

Faure (J. C.). **The Life-history of the Brown Locust,** *Locustana pardalina* **(Walker).**—*Transvaal Univ. Coll.*, Bull. 4, 30 pp., 2 pls. Pretoria, 1923.

This reprint includes six tables, containing the records of cage observations, which were not appended to the original paper [*R.A.E.*, A, xi, 507].

Lounsbury (C. P.). **Entomology.**—*Jl. Dept. Agric. Union S. Africa*, vii, no. 6, pp. 542–549. Pretoria, December 1923.

This is the annual report for the year ending 30th June 1923, and much of the information contained in it has been noticed from the monthly reports. There is urgent need for entomologists to specialise exclusively on forest insects, particularly in view of the serious depredations of the accidentally imported pests of *Eucalyptus*, *Phorocantha* sp. (a borer) and *Gonipterus* sp. (leaf-eating snout-beetle). The situation with regard to inspection and quarantine is reviewed. The greatest trouble is still with Coccids, particularly *Chrysomphalus aurantii* (red scale) on *Citrus*. *Aspidiotus perniciosus* continues to spread gradually. There is not much fear of its being distributed to any great distance on nursery stock, but there is danger of people ignorant of the regulations carrying it to distant places on cuttings for propagation. In spite of precautions, *Stephanitis rhododendri* seems to have gained entrance, as it was found on rhododendrons in a Cape Peninsula nursery ; had there been a fumigation equipment at Cape Town it doubtless would not have survived.

Notes on Cocoa Pests.—*Jl. Gold Coast Agric. & Comm. Soc.*, ii, no. 3–4, pp. 160–163. Accra, April-September 1923.

Sahlbergella singularis, Hagl., causes most trouble in the Gold Coast where cacao is grown on hard subsoil [*cf. R.A.E.*, A, ix, 81]. The predacious Reduviid, *Carcinomma astrologus*, Bergr., which occurs in the Belgian Congo, is not known in the Gold Coast ; when its value has been proved, it may be possible to introduce it. Great injury is caused by thrips [*Heliothrips rubrocinctus*, Giard], which destroy the foliage of cacao. In the case of both these pests the type of cultivation is most important, shade being essential as a protection from thrips.

Barbey (A.) & Ferrière (C.). **Un cas intéressant de parasitologie dans l'écorce du pin sylvestre.**—*Bull. Soc. Vaudoise Sci. Nat.*, lv, no. 211, pp. 77–81, 2 pls. Lausanne, 10th August 1923.

Stumps of pine trees (*Pinus sylvestris*) in the Rhône valley were found to contain the larvae of the Cerambycids, *Leptura rubra*, L., *Rhagium inquisitor*, L., and *Acanthocinus* (*Lamia*) *aedilis*, L., and of the Asilid, *Laphria gilva*, L. Numerous galleries of the Bostrychid, *Myelophilus piniperda*, L., also occurred. The empty galleries of this Bostrychid were invaded by the Sphegid, *Passaloecus brevicornis*, Moraw., which carries into the galleries, as food for its larvae, numbers of *Schizolachnus tomentosus*, De G. (*Lachnus pineti*, F.), or *Eulachnus* (*L.*) *agilis*, Kalt., and by the Chrysids, *Ellampus auratus*, L., and *E. aeneus*, Pz., var. *chevrieri*, Tourn., and the Ichneumonid, *Lochetica pimplaria*, Thoms., which are parasites of *P. brevicornis*. These parasites are in turn devoured by woodpeckers.

Dufrénoy (J.). **La Transmission des Maladies des Plantes par voie biologique.**—Paper read before the *Soc. Path. comp.*, 10th April 1923. 8 pp., 2 figs.

The various relationships that may exist between insects and fungi and other organisms that cause disease in plants are discussed. They include the puncture of a plant by an insect as a means of introduction

of pathogenic spores; mechanical carriage of spores for one plant to another by insects; internal transport of a pathogenic organism, as by nematodes or insect larvae in soil; symbiotic relations between insects and cryptogams, as in the case of *Xyleborus dispar*, which carries in its pharynx living cells of *Monilia candida*; pathogenic organisms that reproduce within the body of insects, such as *Bacillus tracheiphilus* in *Diabrotica* sp., or *B. savastanoi* in *Dacus oleae*; or the use of an insect as alternative host, as in the case of *Physalis* sp. and other plants that act as reservoirs of the virus of mosaic, which is then absorbed by Aphids, which in turn disseminate it among other plants. The relations between the protozoa of plants and man, which are being studied by Franchini and others, open up still further possibilities in this connection.

Weise (J.). **Chrysomeliden und Coccinelliden aus Queensland.** [Chrysomelids and Coccinellids from Queensland.]—*Ark. Zool.*, xv, no. 12, pp. 1–150. Stockholm, 16th May 1923. [Received 27th December 1923.]

This survey of the Chrysomelid and Coccinellid fauna of Queensland has been prepared from collections made by Dr. E. Mjöberg's expedition to Australia in 1910–1913. Existing records from Queensland are intermingled with those from other regions of Australia. Specific keys are given to the Chrysomelid genera *Ditropidus, Chrysolampra, Odontionopa, Trichostola, Rhyparida, Luperodes, Monolepta* and *Longitarsus*.

Tryon (H.). **Tomato Caterpillar or "Worm"** (*Chloridea obsoleta*, **Say.–Noctuidae.**).—*Queensland Agric. Jl.*, xx, no. 5, pp. 365–368, 1 pl. Brisbane, November 1923.

Heliothis (*Chloridea*) *obsoleta*, which often attacks cotton [*R.A.E.*, A, xi, 317], is also in Queensland a serious pest of tomato. The eggs are laid singly on the green calyx segments of the flower bud or flower or on the tender growth of the plant, or on other parts of the plant when the moths are very numerous, and hatch in 3 or more days. The larvae sometimes mature on the foliage, but more generally attack the green fruit, tunnelling their way into it near the calyx end, and pass from one fruit to another. The larvae are mature in 2 or 3 weeks, and then drop to the ground and pupate a few inches below the surface, near the plant. There may be many generations during the long tomato-growing season in Brisbane. Parasites that have been observed in Queensland include a minute egg-parasite (*Trichogramma* sp.), a Tachinid parasite of the larvae, and an Ichneumonid, but their value has not yet been ascertained. Besides the measures recommended [*loc. cit.*] it is suggested that tomatos should not be grown near such alternative food-plants as maize, cotton, Cape gooseberry (*Physalis*), rosella [*Hibiscus*] and tobacco, nor the less favoured food-plants, peas, *Antirrhinum*, etc. It is believed that arsenical sprays will give good results if applied about a week after the eggs first occur.

Jarvis (H.). **Fruit-fly Investigation.**—*Queensland Agric. Jl.*, xx, no. 5, pp. 369–371. Brisbane, November 1923.

The discovery of *Dacus ferrugineus* (*tryoni*) (Queensland fruit-fly) in bananas from Yandina is recorded. This is of importance in

view of the fact that the banana is not included in the list of fruits requiring cool storage before being brought into the Granite Belt. *Doticus pestilans* (apple Anthribid), which never attacks sound and healthy fruit and is therefore not considered a fruit pest, has been reported several times in dried and mummified apples or quinces. The eggs are laid in dried or drying fruit, and the larvae feed in it until about August, when they pupate in the larval tunnels, the beetles emerging in early spring.

A detailed account is given of the liberation of colonies of *Aphelinus mali*, the parasite of the woolly apple aphis [*Eriosoma lanigerum*] received from New Zealand. It is hoped that this parasite may eventually be distributed throughout Queensland, and may prove of value also against the Aphids that infest peach, orange and banana, as it is said to attack any dark-coloured Aphid.

HUSAIN (M. A.) & LAL (M.M.). [**Annual Reports of the Entomologist**] —*Rept. Dept. Agric. Punjab Part II, 1918–19*, pp. 153–157; *1919–20*, pp. 173–184; *1920–21*, pp. 52–67; *1921–22*, pp. 77–92. Lahore, 1920–1923. [Received 1st January 1924.]

During the years under review, much additional data have been obtained regarding the cotton bollworms of India, *Earias insulana* and *E. fabia*. The cotton crop in the fields provides food for them until about mid-January, after which the plants dry up and very few green bolls are to be seen. Moths that emerge in January and February have to find some other suitable plant, and sometimes oviposit on dry cotton sticks, or the Malvaceous weed, *Sida cordifolia*. Only one generation feeds on this weed. Those near gardens choose for preference the hollyhock, and it is the generation reared on this plant that is mainly responsible for the attack on the coming cotton crop. Apparently the insect does not hibernate in the Punjab. Development is, however, very much prolonged in winter, while bacterial and fungous diseases also reduce the numbers considerably then, so that in January and February there are very few bollworms in the fields. These can be further reduced by destroying all cotton sticks left over after the last crop is picked, or, better still, by entirely removing all the plants, and by destroying Malvaceous plants in the vicinity. Various vegetable baits have been tried but without much success. Cardboard sheets smeared with treacle and dragged across the fields have given some success and will be further tried. Recent investigations have shown that one female of *E. insulana* may lay as many as 259 eggs in 4 days, and this number is probably considerably exceeded in the field. The duration of the egg stage is from 2 to 4 days from March to October, or as long as 9 days in winter. The larval period occupies 10–16 days in summer and 50–60 days in winter, and the pupal, 4–9 days in hot weather and from 23 to 73 days during November to February. Temperature has a great influence on the longevity of the adults; in June, moths emerging in the laboratory lived less than a week; during December-March as long as 87 days was recorded.

The parasites attacking *E. insulana* include two unidentified Braconids, a yellow one, which is found only from September to April, and a large brown one, which is more generally prevalent and of which a short life-history is given, and certain Tachinids and Chalcids, as well as *Microbracon lefroyi*, which is by far the most important [*R.A.E.*, A, x, 182], and *Rhogas testaceus*. Minor pests of cotton in the Punjab

include *Platyedra gossypiella* [*R.A.E.*, A, x, 154], and the beetle, *Myllocerus blandus*, which attacks cotton seedlings in April, if maize is not obtainable, leaving cotton about mid-May for maize or juar [*Sorghum*]. The cotton plants are frequently killed when attacked in the cotyledon stage, but later are able to resist attack. Maize, grown either as a trap crop or with cotton, reduces the attack on cotton considerably, and good results are obtained by irrigating the fields, once before sowing the cotton and again a fortnight after germination, with crude oil emulsion on the water. If sowing could be done as early as March or as late as May infestation would be considerably less. Vegetable baits and light traps also seemed to be of some value in control. *Heliothis* (*Chloridea*) *obsoleta*, though never a serious pest, occurred in some localities, as well as *Phycita infusella*, which attacks the seedlings, *Sphenoptera gossypii*, which is a serious pest in other parts of India, and should be studied further, *Acontia* sp., *Tarache* spp., *Sylepta derogata*, *Anomis* (*Cosmophila*) *erosa*, *Dysdercus cingulatus* and *Oxycarenus laetus*.

Moth borers, including *Chilo* sp., *Scirpophaga* sp. and *Polyocha* sp., cause considerable damage to sugar-cane, maize and *Sorghum* [*R.A.E.*, A, x, 156–158]. Dusting with arsenicals was tried on a small scale but the results were inconclusive. In much infested stubble examined only one individual of an Ichneumonid and one of a Tachinid parasite occurred. Light traps attracted a good many moths, and further tests will be made. The best remedy would be the collection and burning of all stubble in the fields after the crop is removed, for it is there that the larvae hibernate. This method without co-operation, however, is almost useless, and legislation is urged as being absolutely necessary to secure concerted action. Minor pests of sugar-cane are *Tanymecus sciurus*, and a bug (*Esmus* sp.).

Mango is heavily damaged by the hopper, *Idiocerus atkinsoni*, which appears in enormous numbers and of which a study has been made [*R.A.E.*, A, x, 158, 218, 390]. A Coccid, *Monophlebus* sp., is sometimes troublesome on mango, but may be killed by spraying with a resin compound. *Euphalerus citri*, the life-history of which is described, is spreading rapidly in the citrus orchards, although it is somewhat heavily parasitised by *Tetrastichus radiatus*. Spraying with crude oil emulsion and tobacco decoction gave good results. It is pointed out that citrus hedges around citrus gardens often harbour the Psyllid in large numbers and should not be maintained. While this species has been somewhat decreasing in numbers, *Dialeurodes citri* is very harmful; the bionomics are being studied with a view to control. Castor, which has become a very important crop in the Punjab, is attacked by various leaf-eating caterpillars of the genus *Euproctis*, of which *E. lunata* is the commonest. There are many generations in a year, three having been observed between February and June. The caterpillars eat the leaves voraciously and even devour the small twigs and green cell layers of the stem. The egg-masses, laid on the lower surface of the leaves, should be collected and destroyed, and the caterpillars, when sprayed with hot water by a powerful sprayer, fall to the ground and can be destroyed by flooding.

Experiments in connection with pests of stored grain have confirmed the value of air-tight storage. This process, carried out for 28 days in September, was found to kill all stages of insects. Superheating was also used successfully in some cases.

Notes on sericulture during the period under review are included.

KUNHI KANNAN (K.). **The Function of the Prothoracic Plate in Mylabrid (Bruchid) Larvae (A Study in Adaptation).**—*Mysore Dept. Agric.*, Ent. Ser. Bull. no. 7, 47 pp., 3 pls. Bangalore, 1923. [Received 2nd January 1924.]

The function of the prothoracic plate in Bruchid larvae, which is used to obtain purchase for the larva in excavating a hole, is explained. The need of apodous larvae of various groups for such a purchase for penetrating hard surfaces is discussed. It is suggested as possible that insect pests in which the first larval instar requires purchase might be controlled by methods that deprive their larvae of the facilities for purchase.

JACK (H. W.). **Rice in Malaya.**—*Dept. Agric. F. M. S & S. S.*, Bull. 35, 96 pp., illus. Kuala Lumpur, 1923.

This paper, which includes a chapter on rice pests, is almost identical with one noticed previously [*R.A.E.*, A, xi, 440].

HARUKAWA (C.). **Second Notes on the Oriental Peach Moth, *Laspeyresia molesta* Busck.**—*Ber. Ohara Inst. landw. Forschungen*, ii, no. 3, pp. 235–258. Kurashiki, 1923.

The results of further work on *Cydia* (*Laspeyresia*) *molesta*, Busck [*cf. R.A.E.*, A, vii, 108; viii, 321] are given.

This moth is found in many of the districts of Japan where peaches or pears are grown. On the mainland there are 4 or 5 generations a year, the last hibernating in the larval stage. The larvae injure the young shoots and the fruits of the sand pear [*Pyrus sinensis*], pear, peach, apple, and apricot. The shoots of the Japanese flowering cherry [*Prunus serrulata*], cherry, plum, Japanese apricot [*Prunus mume*], and sand cherry [*Prunus puvimura*] are also injured. In spring the adult emerges generally between mid-April and mid-May. The larvae injure the shoots of the peach, cherry, etc., in the spring and early summer; from about mid-July most of them are found in the fruit of the sand pear. In a peach orchard the eggs are laid chiefly on the leaves, but in a pear orchard they are laid chiefly on the ripe fruit. When the pears are young and hard the moth prefers the peach tree to the pear tree for oviposition. When the pears are ripe many of the adults migrate to them from neighbouring peach orchards.

MCDANIEL (E. I.). **Mealy-bugs on House Plants.**—*Qtrly. Bull. Michigan Agric. Expt. Sta.*, vi, no. 2, pp. 69–71, 2 figs. East Lansing, Mich., November 1923.

Mealy-bugs are often very destructive on ornamental plants grown for decorative purposes, the commonest in Michigan being *Pseudococcus citri*, Risso, and *P. adonidum*, L. (*longispinus*, Targ.). The simplest remedy is to wash the mealy-bugs off with a stream of water, or, where there is no water pressure, plants may be swished about in warm soap-suds for several minutes. Plants of delicate texture should then be rinsed in clear, lukewarm water, and the treatment repeated perhaps once a week for 3 or 4 weeks. A proprietary preparation is also recommended.

Pettit (R. H.). **White Grubs.**—*Qtrly. Bull. Michigan Agric. Expt. Sta.*, vi, no. 2, pp. 71–72. East Lansing, Mich., November 1923.

This account of white grubs [*Lachnosterna*] is largely based on a paper previously noticed [*R.A.E.*, A, ii, 121 ; vi, 568].

Cotton (R. T.). U.S. Bur. Ent. **Notes on the Biology of the Cadelle, *Tenebroides mauritanicus* Linné.**—*Jl. Agric. Res.*, xxvi, no. 2, pp. 61–68. Washington, D.C., 13th October 1923. [Received 7th January 1924.]

In the vicinity of the District of Columbia *Tenebroides mauritanicus*, L., passes the winter in the adult and larval stages. The eggs are placed in batches of 10 to 40 in the flour or other food-material, or even in a crevice, but always if possible in a protected situation. In one case a total of 1,190 eggs were laid by one individual between 1st July and 15th October. Many beetles under observation laid over 500 eggs. During April and the first week in May when temperatures ranged between 54° and 78° F., with a mean of about 68° F., most of the eggs hatched in 10 days ; later when the mean temperature was about 79° F. they hatched in 7 days, the period lengthening again with the advent of cooler weather.

Under favourable conditions the larvae develop rapidly ; 39 days is the shortest period recorded. Larvae that hatch in late summer or early autumn hibernate and complete their development the following spring. Unfavourable conditions and improper food may lengthen the larval stage almost indefinitely [*cf. R.A.E.*, A, x, 483]. The larvae apparently never feed on the bodies of dead larvae and rarely molest any other insect larva. For pupation the larvae prefer to bore into a piece of soft wood (walls, floors or wooden bins may show evidence of their burrowing), though the cell may be constructed between boards or in a hollowed-out kernel of maize. The average duration of the pupal stage was from 12 to 13 days. From these observations it would appear that in the District of Columbia the normal life-cycle is as follows :—Adults and larvae of all stages pass the winter in hibernation. The overwintering adults lay eggs in spring. The resulting midsummer adults lay eggs the larvae from which overwinter. The larvae that overwinter transform in the spring, and the emerging beetles lay eggs all through the summer and hibernate during the following winter.

Yothers (W. W.). U.S. Bur. Ent. **Citrus Conditions in the Rio Grande Valley and the Satsuma Sections of Alabama together with additional Notes on San José Scale Situation in Northwestern Arkansas.**—*Florida Ent.*, vii, no. 2, pp. 17–20. Gainesville, Fla., October 1923.

Practically the same pests of *Citrus* are found in the Rio Grande Valley as in Florida. The Florida red scale [*Chrysomphalus aonidum*] is considered the most injurious, and next is the California red scale [*C. aurantii*] (or this may be *C. dictyospermi*). The groves were badly damaged, some being saved from total destruction by two or three applications of oil emulsion in the winter. *Parlatoria pergandei* (chaff scale) does great damage to the twigs and trunk, and *Lepidosaphes gloveri* (long scale) is fourth in importance. The citrus

whitefly [*Dialeurodes citri*] is also said to be present. Citrus rust mite [*Phyllocoptes oleivorus*] is often extremely abundant, and leaves and fruit are badly russeted; dusting with sulphur will, however, control it.

San José scale [*Aspidiotus perniciosus*] was the cause of the death of many acres of apple trees in northwestern Arkansas; oil emulsions have been used against it with very successful results.

Ewing (H. E.). U.S. Bur. Ent. **The Generic and Specific Name of the Orange Rust Mite.**—*Florida Ent.*, vii, no. 2, pp. 21–22. Gainesville, Fla., October 1923.

The orange rust mite was originally described by Ashmead as *Typhlodromus oliioorus*. From his subsequent writings it is clear that the specific name was intended to be *oleivorus*. The genera *Typhlodromus* and *Phytoptus*, to which the mite is sometimes referred, are both synonyms of *Eriophyes*. The orange rust mite is not, however, an *Eriophyes*, but clearly belongs to the genus *Phyllocoptes*. The correct name should therefore be *Phyllocoptes oleivorus*, Ashm.

Bates (D. M.). **A Geometrid Larva on Grapefruit.**—*Florida Ent.*, vii, no. 2, p. 22. Gainesville, Fla., October 1923.

A number of larvae of the Geometrid, *Microgonia vesulia*, Cram., have been collected from grapefruit trees, but parasitism by a Tachinid is so general as to prevent it from becoming a serious pest.

A Promising New Bait.—*Florida Ent.*, vii, no. 2, p. 24. Gainesville, Fla., October 1923.

The addition of nitrobenzene as a flavouring to poison bait (25 lb. bran to 1 lb. Paris green) has been found to make it very attractive to a variety of insects, including tobacco and other wireworms and caterpillars, such as the celery leaf-tyer [*Phlyctaenia ferrugalis*] and Crambids.

Food Habits of the Pecan Twig Girdler.—*Florida Ent.*, vii, no. 2, p. 26. Gainesville, Fla., October 1923.

Oncideres cingulata (hickory twig-girdler) is recorded as attacking roses in Florida. It also often attacks various trees other than the hickories, including occasionally *Citrus* and in the northern States apple, plum, pear and peach.

Malenotti (E.). **Per una più rapida diffusione dell' Afelino del Melo.** [A Method for distributing *Aphelinus mali* more rapidly.]—Reprint, 3 pp., 1 fig., dated 5th November 1923 from *Il Contadino della Marca Trivigiana.* [Treviso, 1923.]

The most suitable conditions for effecting the spread of *Aphelinus mali*, Hald., recently introduced into Venetia against the the woolly apple aphis [*Eriosoma lanigerum*], are mentioned. As a parasite of large size can oviposit in about five times as many Aphids as one of

small size, infested material should be affixed to the most abundantly infested trees, so that there may be a large number of large-sized Aphids available that will yield parasites also of large size.

Poutiers (R.). **Utilisation et élevage des Insectes auxiliaires.**—*Rev. Zool. agric. & appl.*, xxii, no. 8, pp. 209–216, 1 fig. Bordeaux, August 1923.

An account is given of some of the notably successful results that have been obtained by the biological method of controlling insect pests.

Charrier (H.). **Le Termite lucifuge dans la region de Tanger.**—*Rev. Zool. agric. & appl.*, xxii, no. 8, pp. 216–217. Bordeaux, August 1923; also *Bull. Soc. Sci. nat. Maroc*, iii, no. 7, p. 131. Rabat, 30th November 1923.

Leucotermes (*Reticulitermes*) *lucifugus*, Rossi, which has long been present in small numbers in Morocco and in the Tangiers region, has, during the last two years, appeared in enormous numbers, the walls of certain buildings being covered with the winged forms during swarming time. The chief breeding-place of these insects seems to be a plateau about 9½ miles to the south-west of the town, where a number of old olive trees have been felled and have apparently become nests for the termites. The spread of this insect should be watched, and care should be taken in using wood for building purposes.

Feytaud (J.). **Les Insectes du Mais. La Noctuelle ou Sésamie** (*Sesamia nonagrioides*, **Lef.**).—*Rev. Zool. agric. & appl.*, xxii, no. 8, pp. 218–223, 1 fig. Bordeaux, August 1923.

In the south-west of France, the Noctuid, *Sesamia vuteria* (*nonagrioides*), has recently become a serious pest of maize [*cf. R.A.E.*, A, x, 265]. The larvae live in the stems of Gramineae, sometimes tunnelling to the top of the stalk and eating the head, though generally the lower part of the stalk is attacked. There appear to be at least two generations a year in France, the first injuring maize in July and the other in October; the larvae of the second generation hibernate in the base of the stems. The essential method of control is to remove and burn all the old maize stalks after the crop is harvested. Co-operation is, however, essential, if this method is to be successful. Other measures recommended are the capture of the adults by light traps or bait traps, spreading powdered iron sulphate on the ground, dipping the young plants in milk of lime or dusting them with lime after planting, and retarding germination by selection of seed or by dipping the seed in certain solutions.

Rathsamhausen (J. de). **Les Maladies des Abeilles. L'inspection sanitaire et l'assurance.**—*Rev. Zool. agric. & appl.*, xxii, no. 8, pp. 223–229. Bordeaux, August 1923.

On the analogy of what has been done in other countries, the author urges beekeepers to form a national union for organising measures

against bee diseases, and to seek State aid for the proper inspection of hives. The importance of understanding the various diseases of bees is also pointed out.

FEYTAUD (J.). **L'Arséniate diplombique contre les Vers des fruits.**—*Rev. Zool. agric. & appl.*, xxii, no. 8, pp. 229–231. Bordeaux, August 1923.

This paper on the value of diplumbic lead arsenate has already been noticed from another source [*R.A.E.*, A, xi, 464].

PETHERBRIDGE (F. R.). **The Common Cause of Failure of Spring Oats —Frit Fly.**—*Jl. Minist. Agric.*, xxx, no. 10, pp. 925–928. London, January 1924.

The importance of early sowing of spring oats to avoid damage by frit fly [*Oscinella frit*, L.] is pointed out. The differences in yield due to date of sowing will vary with the season, and the type of land; but on all soils, even the very best, there is usually a very considerable superiority in the yield of early sown spring oats. Where it is impossible to get a tilth early in the season (February and early March), it is probably more profitable to substitute some other crop, such as barley.

The Larch Longicorn Beetle (*Tetropium gabrieli*, **Weise**).—*Forestry Commiss.*, Leaflet no. 13, 4 pp., 3 figs. London, 1923.

Tetropium gabrieli, Weise, was first recorded in England in 1903. It is now known to occur almost all over England, being most abundant in the south. It has so far not been recorded from Scotland, but there is every possibility of it being transported with larch timber. Under natural conditions it breeds in larch, though in captivity, in the absence of larch, it was induced to oviposit in Scots pine [*Pinus sylvestris*] and spruce logs. Healthy trees are not attacked, but those infected with honey fungus or the heart-rot fungus appear to be particularly attractive. In all cases where this Longicorn has been reported from living trees they were found to be suffering from fungus damage, or were suppressed or growing in unsuitable conditions. The eggs are laid in crevices of the bark of the main stem in June and July; they hatch in about a fortnight. The larvae feed between the bark and sapwood until September or October, after which a right-angled tunnel is made into the sapwood. Hibernation occurs in this tunnel. The larvae pupate in April, and the adults emerge in May and June, the normal life-cycle thus occupying about a year. In very warm weather it may be completed in three or four months, causing overlapping of the broods. The chief damage is due to the adult larvae boring in the sapwood, and though even this does not materially reduce the value of the timber, the presence of the beetle should always be considered as an indication that other more destructive agents are at work.

The remedial measures recommended are regular inspection of trees and early removal of dead and dying stems, control of fungi, barking or barking in strips of felled larch, running 3 or 4 strips of tar along felled stems to deter the beetle from oviposition, creosoting larch posts and rails used for fencing, barking of larch in timber yards and burning all slabs, etc., containing larvae or eggs.

Spessivtseff (P.). **Zweiter Beitrag zur Kenntnis der Borkenkäferfauna Schwedens.** [A Second Contribution to the Knowledge of the Bark-beetle Fauna of Sweden.]—*Ent. Tidskr.*, xliv, no. 3–4, pp. 200–214, 5 figs. Stockholm, 1923. [Received 8th January 1924.]

The results of observations made in the summer of 1922 are given here in continuation of a previous paper [*R.A.E.*, A, x, 203.]

Polygraphus poligraphus, L., is distributed throughout the country, while *P. subopacus*, Thoms., chiefly occurs in the northern half where *P. punctifrons*, Thoms., is exclusively found. The first two attack standing spruce, and may kill the trees. *P. punctifrons* almost always infests spruce lying on the ground, pines being rarely attacked. Infestation by *Carphoborus rossicus*, Semenov, always follows that by *P. subopacus*, which produces the requisite dryness of the bark. *Crypturgus cinereus*, Hbst., occurs abundantly throughout the country, *C. hispidulus*, Thoms., is found in the north and *C. pusillus*, Gyll., more in the south and centre. Further records seem to confirm the occurrence of *Ips duplicatus*, Sahlb., throughout northern Sweden. Careful examination shows that *Pityophthorus fennicus*, Eggers, is a synonym of *P. micrographus*, L., the beetle occurring in Sweden, Finland, Russia and Siberia. The insect recorded as *P. micrographus* in Central Europe is not the same, and does not occur in Sweden. Its name should perhaps be *P. pityographus*, Ratz. *P. micrographus* occurs in spruce forests all over Sweden, being often a primary pest. *P. trägardhi*, Spess., attacks dying branches at the summits of standing spruce trees that are perishing rapidly through previous injury by *Ips typographus*, L., *Pityogenes chalcographus*, L., and *Pityophthorus micrographus*. In branches over ¼ in. thick the last two species and *Cryphalus saltuarius*, Weise, were found with it. *Pityophthorus glabratus*, Eichh., attacks 1 or 2-year-old shoots of standing pines previously attacked by other bark-beetles or *Myelophilus piniperda*, L. It may occur in branches of quite healthy trees. *Dryocoetes hectographus*, Reitt., has been found in northern Sweden in spruce lying on the ground, sometimes with *D. autographus*, Ratz. *Carphoborus cholodkovskyi*, Spess., was found attacking the trunks of standing pines killed in 1921 by *Myelophilus piniperda*; *Pityogenes monacensis*, Fuchs, was observed with *P. bidentatus*, Hbst. (*bidens*, F.) in the same stand as the preceding species, with mines in branches of pines infected with *Peridermium*; *P. trepanatus*, Nördl., was recorded from the branches of *Pinus montana*; and *Xyloterus signatus*, F., from birch.

In spite of the similarity of climate between the southern part of Sweden and the continent of Europe, three European species, *Ips amitinus*, Eichh., *Pityophthorus exsculptus*, Ratz., and *P. pityographus*, Ratz., are missing, while species absent in Central Europe are present. This may be explained by the fact that spruces are introduced from Finland and northern Russia.

Trägårdh (I.). **Mal och Medel inom Skogsentomologien.** [The Aims and Methods of Forest Entomology.]—*Medd. Stat. Skogsförsöksanst.*, xx, no. 2, pp. 209–240, 16 figs. Stockholm, 1923. (With a Summary in German.)

The occurrence of secondary pests is a marked feature of forest entomology, and they may often be checked by artificial measures.

The size of trees and their long life makes it possible to study the sequence in which various pests appear better than in the case of agricultural entomology. The study of the origins of outbreaks and of the biology of the species concerned is essential. Check areas should be examined not only during an outbreak, but in normal times to obtain data on the occurrence of the insects. In the case of bark-beetles the examination of trap-logs over a long period together with weather records will enable the effect of climate to be estimated.

SPESSIVTSEFF (P.). **Bidrag till Kännedomen om Bruna Öronvivelns (*Otiorrhynchus ovatus* L.) Morfologi och Biologi.** [A Contribution to the Knowledge of the Morphology and Biology of *O. ovatus*.]—*Medd. Stat. Skogsförsöksanst.*, xx, no. 3, pp. 241–260, 10 figs. Stockholm, 1923. [With a Summary in German.]

In the spring of 1922, a severe infestation of 3-year-spruce by *Otiorrhynchus ovatus*, L., began in a forest nursery in southern Sweden, and by the spring of 1923 about 400,000 trees were killed, owing to the roots being stripped of their bark by the larvae. Adults emerging in autumn hibernate in an immature state in the ground and feed in spring on the needles, and perhaps also on the leaves of various plants. They oviposit in July or August. The larvae hatch in about two weeks; they hibernate once or twice, feeding on the roots in summer and pupating in autumn. Parthenogenetic reproduction occurs. In North America *O. ovatus* has not apparently been recorded from conifers, and there are also differences in the morphology, so that it is suggested that the American and European forms are distinct, parallel species.

TRÄGÅRDH (I.). **Skogsentomologiska Bidrag II.** [Forest Entomological Contributions II.]—*Medd. Stat. Skogsförsöksanst.*, xx, no. 6, pp. 401–424, 18 figs. Stockholm, 1923. [With a Summary in English.]

The larvae of a Syrphid, *Chilosia morio*, Zett., have been found in the resin of spruce trees in Sweden. It seems established that the larva feeds on the sap.

Pissodes piniphilus, Hbst., is now known to be common in pines in Sweden, and capable of causing serious injury. The crowns of pines are chiefly attacked, but on smaller trees the greater part of the trunk may be affected. In all instances examined *P. piniphilus* started the attack, sometimes following *Peridermium*. In most cases *Myelophilus piniperda*, L., followed in the next year in the lower part of the trunk, except when the attack by the pine-weevil had been very severe, when *Hylastes* (*Hylurgops*) *palliatus*, Gyll., occurred instead. Sometimes *P. pini*, L., occurred in the same year as *P. piniphilus*, but in the lower part of the trunk, and in some cases *Carphoborus cholodkovskyi*, Spess., succeeded in the following year.

The larva of *Rhynchaenus* (*Orchestes*) *testaceus*, Müll., mines in the leaves of birch and alder. After pupation, the circular black cocoon is conspicuous in the mine. In some local outbreaks nearly all the leaves were attacked.

During an outbreak of *Lyda signata*, F. (spruce sawfly) at Dalby in southern Sweden *Trichogramma evanescens*, Westw., was bred from the eggs of the sawfly. *Oophthora semblidis*, Auriv., and *T. piniperdae*, Wolff, are considered synonyms of this Chalcid. *T.*

evanescens, therefore, is very widely distributed and has many hosts, not less than 30 being recorded. At Dalby it killed about 90 per cent. of the eggs of the sawfly in 1919; in 1923 the latter increased again, and climatic conditions being unfavourable, the parasite killed only 5 per cent. of the eggs. Other parasitic Hymenoptera taken during this outbreak from sawfly pupae and cocoons collected in the ground were *Xenoschesis fulvipes*, Hgn., *Limnerium crassifemur*, Thm., *Mesochorus sylvarum*, Curtis (probably a hyperparasite), and *Holocremna* sp. A list of eleven other species caught in the forest is given.

REYNE (A.). **Verslag van den entomoloog.** [Entomologist's Report.] —*Dept. Landbouw, Suriname, Verslag 1922*, pp. 32–39. Paramaribo, 1923.

The results will be published later of work done in 1922 on the cacao thrips [*Heliothrips rubrocinctus*], the green coffee scale, *Coccus* (*Lecanium*) *viridis*, Green, and the coconut boring caterpillar, *Castnia daedalus*, Cram.

C. daedalus appears to be the species infesting bananas, and not *C. licus* as previously stated [*R. A. E.*, A, viii, 536].

A small beetle, probably *Epitrix* sp., proved injurious to tobacco by perforating the leaves. Orange trees were defoliated by *Coptotermes marabitanos*, Silv., previously recorded as a pest of coffee. A parcel of kernels of the Maripa palm (*Maximiliana maripa*) was infested with the larvae of *Pachymerus* sp. *Rhynchophorus palmarum*, L., was taken from the hearts of coconut palms about 2–3 years old; this seems to have been a primary attack.

A house at Paramaribo was invaded by *Monomorium destructor*, Jerd. The Barber formula [*R. A. E.*, A, viii, 285] for poisoning *Iridomyrmex humilis*, Mayr, proved too weak, and when the amount of poison was increased this bait was avoided. This applied also to another poison [*R. A. E.*, A, vi, 461]. A list of other ants recorded is given. Cassava used as a shade plant below a higher one for young cacao was badly injured by *Corynothrips stenopterus*, Williams. Such serious injury has not been noticed in the case of unshaded cassava.

RAMBOUSEK (F.). **O brucích na řepě.** [About Beetles on Beet.]—*Ochrana Rostlin*, iii, nos. 1–6, pp. 9–12, 29–31, 33–37, & 48–52, 5 figs. Prague, May-December 1923.

Notes are given on the various Coleopterous pests of beet occurring in Czecho-Slovakia. They are arranged according to the families and keys are given to facilitate their identification.

FARSKY (O.). **Bekyně zlatořitná a její hubení.** [*Nygmia phaeorrhoea* and its Control.]—*Ochrana Rostlin*, iii, no. 5, pp. 37–41, 2 figs. Prague, November 1923.

Nygmia phaeorrhoea, Don. (*Euproctis chrysorrhoea*, L.) appears to be increasing in Czecho-Slovakia, a great deal of damage being caused to fruit trees and oak forests in the southern and central parts of Moravia. The various stages and the life-history of this pest are described, and remedial measures, such as the destruction of winter nests and the application of arsenicals, are discussed.

JUHA (V.). **Pilous cerný—nicitel obilí na sýpkách.** [*Calandra granaria*, L., a Pest of stored Grain.]—*Ochrana Rostlin*, iii, no. 6, pp. 52–54, 1 fig. Prague, December 1923.

A great deal of damage is caused to stored grain by weevils [*Calandra granaria*, L.] in Czecho-Slovakia. The importance of keeping all storing places clean is pointed out, and the application of remedial measures, such as lime wash and fumigation, is discussed.

ARNAUD (G. & Mme.). **La lutte contre les Insectes par les champignons parasites.**—*C.R. Acad. Agric.*, ix, no. 34, pp. 863–867. Paris, 28th November 1923.

The possibility of increasing the action of entomogenous fungi indigenous to France by their artificial dissemination has been studied under laboratory conditions. It is evident that many spores of the commonest muscardine fungi never reach the insects that they might destroy, even when the latter are in the most favourable conditions for their development. Healthy insects remained free from disease in the laboratory although fully exposed at a very short distance from infected insects that had been sprayed with fungus spores. It is hoped to undertake field experiments next year, particularly with the caterpillars of *Pieris brassicae*, which are highly susceptible to sprays of fungus spores in the laboratory. Certain difficulties in the application of this method are discussed; in the south of France the weather is often very dry, but after rain the atmosphere at the level of low-growing plants remains saturated throughout the greater part of the night, and this is sufficiently long to ensure infection. In the case of insects that are in the habit of sheltering at times in the soil, such as the grey vine caterpillar [*Feltia exclamationis*] or the Colorado potato beetle [*Leptinotarsa decemlineata*], if these are sprayed before their descent, the atmosphere of the soil will be favourable for the development of the spores.

ROEBUCK (A.) & BROWN (P. S.). **Correlation between Loss of Leaf and Damage to Crop in Late Attacks on Wheat.**—*Ann. App. Biol.*, x, no. 3–4, pp. 326–334, 6 figs. Cambridge, December 1923.

In order to find a basis for estimating the effect of the loss of a given percentage of leaf surface on the yield of wheat, strips of wheat in a field were variously treated by removing all the leaf blades, by cutting off half of each blade, and by removing all leaves on the bottom half of the plants. The length, volume and weight of the ears were then computed on treated and untreated plants (the ears having already formed when the test began). In length of ear no difference could be observed as a result of the process. In volume, the grain from stripped plants was in general smaller than that from half-stripped ones, while that from bottom-stripped plants was very variable and the average ultimately was the lowest. Although the loss of crop in this respect could not be estimated, there is clear indication that interference with the leaf area considerably hindered the filling out of the grain. Where weight was in question, a regular and close connection with damage to leaf was observable, as shown in the tables. The loss of crop was large when the plants were young and became steadily smaller as the plant approached maturity. Interference with the leaves during the period of fertilisation reduced the crop by approximately 50 per cent. The bottom-stripped

plants consistently produced small crops, suggesting that the lower leaves play a considerable part in grain formation. By means of graphs, the total crop depression at weekly intervals is stated, and this provides a basis for calculating the effect of various leaf-attacking pests on the yield. The regularity of crop depression due to loss of leaf surface is also represented in diagrammatic form. An illustration is given in the case of an attack of *Agromyza ambigua* on wheat during 1922, and the method of computing the loss due to this fly is explained.

MILES (H. W.). **Observations on the Bionomics of the Apple-blossom Weevil, *Anthonomus pomorum*, Linn.**— *Ann. App. Biol.*, x, no. 3–4, pp. 348–369, 2 pls., 11 figs. Cambridge, December 1923.

A more detailed account is given of the life-history and habits of *Anthonomus pomorum*, L. (apple blossom weevil) in England than that previously noticed [*R. A. E.*, A, x, 607], a further study having been made during 1920–22. Examination of old apple trees revealed the presence of large numbers of hibernating weevils, and there is no doubt that where old trees stand in close proximity to plantations, infestation is likely to occur each year. All stages of the weevil are described, a full description being given of the adult, including that of the alimentary and genital systems. The distribution of the weevil is limited by certain factors, one of which is the occurrence of the food-plants, apple, pear and crab apple. Climate also has a considerable influence, bright sun and warm days in early spring inducing the weevils to leave their winter quarters and begin feeding, while protracted cold and dull weather lengthens the oviposition period so that the number of capped blossoms is considerably increased. Natural enemies include woodpeckers, tits and sparrows, several parasitic insects, of which the chief is *Pimpla pomorum*, Ratz. [*R. A. E.*, A, vi, 280], and the predacious thrips, *Haplothrips tritici*, Kurdj., as well as a fungus (probably *Isaria* sp.).

GOODEY (T.). **Quiescence and Reviviscence in Nematodes, with special Reference to *Tylenchus tritici* and *Tylenchus dipsaci*.**— *Jl. Helminthology*, i, no. 2, pp. 47–52. London, May 1923.

From various experiments in connection with the number of years during which larvae of *Tylenchus tritici* in wheat galls can retain their vitality the conclusion is drawn that the longest period of quiescence following which there is sound evidence of observed mobility of the larvae is about nine years. In the case of *T. dipsaci* in onions and narcissus bulbs, the period appears to be about two years. These quiescent Nematodes are not first stage larvae, as are those of *T. tritici* within the wheat galls, but are probably larvae in the last stage of development before becoming sexually mature.

GOODEY (T.). **A Review of the Plant Parasitic Members of the Genus *Aphelenchus*.**— *Jl. Helminthology*, i, no. 4, pp. 143–156. London, September 1923.

The Nematodes dealt with are *Aphelenchus fragariae*, Ritz., attacking strawberry plants, *A. cocophilus*, Cobb, causing red-ring disease of coconut palms in the West Indies, *A. ritzemabosi*, Schwartz, destroying the leaves of *Chrysanthemum*, *A. ribes*, Taylor, in buds of black currant, *A. olesistus*, Ritz., in stems of ferns, *Begonia* and *Cypripedium*, and *A. olesistus* var. *longicollis*, Schwartz, in the stem tissue of cultivated violets.

Particulars are given of the structure and biology of each species with the symptoms of disease caused by it, and there is a general discussion as to appropriate treatment.

Some form of heat treatment of infective soils appears likely to give the best results, owing to the fact that comparatively low temperatures are lethal to the parasites.

GOODEY (T.). **Eelworm Disease of Potatoes caused by** *Tylenchus dipsaci*.—*Jl. Helminthology*, i, no. 5, pp. 197–204, 1 pl. London, December 1923.

Potato disease due to *Tylenchus dipsaci* has been known in the eastern counties of England and in Scotland for the past twelve years. The stems and foliage of the plants generally show no sign of the disease, but it may be easily detected in the tubers, where discolouration of the surface in small patches is apparent, with a breaking down of the skin and an obvious destruction of the underlying tissues. The Nematode attacks the tubers direct from the soil and not by way of the plant. It is probable that this Nematode is capable of remaining dormant in the soil for at least two years. The following remedies are suggested. As the disease has so far only shown itself on second earlies or late varieties of potatoes towards the time of ripening, the use of early varieties may be recommended. Any late kinds grown should be those that are little susceptible to the disease, such as "King Edward." Only perfectly sound seed potatoes should be used. Where the disease is present, special precautions should be taken in lifting the tubers to ensure that no diseased ones are left in the soil. As a radical remedy the treatment of infected soil by heat may be recommended, the Nematodes being killed at a temperature of 50–60° C. [122–140° F.].

OHAUS (F.). **Beiträge zur Kenntnis von der Lebensweise unserer einheimischen Blatthornkäfer.** [Contributions to the Knowledge of the Life-history of German Lamellicorn Beetles.]—*Ent. Rundsch.*, xl, nos. 10–12, pp. 37–39, 41–43, 45–49. Stuttgart, 1923.

Notes on a number of species of Lamellicorns are given, including several common pests.

SCHAFFNIT (E.). **Einige Beobachtungen über** *Meligethes aeneus* **und Versuche zu seiner Bekämpfung in den Jahren 1920 und 1921.** [Some Observations on *M. aeneus* and Experiments in its Control in 1920–21.]—*Centralbl. Bakt. Protozool. Paras. & Infekt.*, IIte. Abt., lviii, no. 19–24, pp. 438–447, 1 map. Jena, 25th May 1923.

It has been noticed repeatedly that early-blossoming varieties of rape suffer less from *Meligethes aeneus*, L., because the critical period for attack is over by the time the beetle appears. This is not always the case, however, for in 1920 the attack began as soon as the first buds were seen. The beetle does not necessarily appear in April and May, but ends its hibernation as soon as the soil has been sufficiently warmed by the sun. In a cold spring the rape develops slowly but steadily, while the beetle remains in hibernation, but in a warm spring it is precisely the early-blossoming varieties that suffer most. The

author does not regard this beetle as a serious factor in pollination, nor does he agree that much of the injury ascribed to *M. aeneus* is really due to *Ceuthorrhynchus napi*, Koch, and *C. assimilis*, Payk., only about 2–3 per cent. of the catches being of these species [*cf. R.A.E.*, A, x, 465, etc.]. Experiments with arsenicals gave contradictory results. It is considered that such sprays are toxic to *M. aeneus* and are useful to protect the buds in spring.

Börner (C.). **Ueber Schädlichkeit, Pollenübertragung und Arsenfestigkeit des Rapsglanzkäfers. Eine Erwiderung an Herrn Professor Schaffnit.** [On the Injuriousness, Pollen Carriage and Resistance to Arsenic of the Rape Beetle. A Reply to Prof. Schaffnit.]—*Centralbl. Bakt. Protozool. Paras. & Infekt.*, IIte. Abt., lviii, no. 19–24, pp. 448–454, 2 figs. Jena, 25th May 1923.

In this criticism of the preceding paper it is stated that the hibernating individuals of *Meligethes aeneus* emerge gradually and not all at a given moment. Arsenicals are not considered satisfactory for protecting the buds, only a low mortality having been recorded in experiments in feeding the beetles with poisoned material.

Schaffnit (E.). **Schlusswort zu der Erwiderung Börners.** [A Final Word on Börner's Reply.]—*Centralbl. Bakt. Paras. & Infekt.*, IIte. Abt., lx, no. 14–17, pp. 339–341. Jena, 15th November 1923.

Various points raised in the preceding paper are here discussed.

Schaal (G.). **Der ungleiche Borkenkäfer,** *Bostrychus dispar.* [The Bark-beetle, *Xyleborus dispar.*]—*Dtsch. Obstbauztg.*, 1922, pp. 205–206. (Abstract in *Centralbl. Bakt. Paras. & Infekt.*, IIte. Abt., lx, no. 7–13, p. 235. Jena, 25th October 1923.)

Young apple, pear and stone-fruit trees are those chiefly attacked by *Xyleborus* (*Bostrychus*) *dispar*, which is supposed to fly into orchards from neighbouring forests or to be introduced in posts. To prevent boring into the sapwood the trunks should be painted with a mixture of mud, lime and fruit-tree carbolineum. If the trees are already infested, the application must be repeated in spring by first painting with a 20–30 per cent. solution of carbolineum and then giving a coat of mud and lime. This will kill the beetles.

Kroemer (K.). **Weinbau, Reblausbekämpfung und Rebenveredlung im Rheingau.** [Viticulture, Work against the Vine Louse and Vine Grafting in the Rheingau.]—*Festschr. d. Höh. Staatl. Lehranst. f. Wein-, Obst- u. Gartenbau, Geisenheim a. Rh.*, p. 31. (Abstract in *Centralbl. Bakt. Paras. & Infekt.*, IIte. Abt., lx, no. 7–13, pp. 274–276. Jena, 25th October 1923.)

In view of the rapid spread of the vine-louse [*Phylloxera*] in the Rhenish vine-growing districts there appears to be no hope of eradicating this Aphid. During the period of transition from existing conditions to those of growing vines on resistant American stocks the life of an infested vine may be prolonged 12–15 years by a free use of insecticides such as carbon bisulphide. Börner's proposal to grow

only "immune" and "half-immune" stocks [*R. A. E.*, A, x, 255, 617; xi, 342] has the disadvantage that the "resistant" varieties are indispensable at the present stage of knowledge of grafting, while it is not absolutely proved that the northern form [*P. vastatrix*] is the only one in Germany or that the southern form [*P. vitifolii*] cannot be established there.

SCHULZE (H.). **Zur Kenntnis der Dauerformen (Hypopi) der Mehlmilbe** *Tyroglyphus farinae* **(L.).** [A Contribution to a Knowledge of the Hypopi of the Flour Mite, *T. farinae*.]—*Centralbl. Bakt. Paras. & Infekt.*, IIte. Abt., lx, no. 22–24, pp. 536–549, 1 pl. Jena, 18th January 1924.

The flour mite, *Tyroglyphus farinae*, L., occurs not only in the mobile hypopial form, but also another, which the author calls hypopus II. This is non-mobile and yet rarely encysted. Both hypopi yield normal adults. Their morphology is described. Hypopus I shows a negative phototropism, but no result with light could be obtained with hypopus II owing to its non-mobility. Hypopus I reacts very markedly to mechanical excitation. If an object 2 mm. away is moved this hypopus assumes the attitude in which it seeks to attach itself to a carrier for transportation. Hypopus II reacts only by a slow movement of its fore-legs, and many individuals fail to do even this. The effect of moisture is important. Hypopus I is but little protected against desiccation at the normal temperatures of 16–18°C. [60·8–64·4°F.] and soon perishes, so that its life under natural conditions must be short. On the other hand hypopus II is very resistant to the dry conditions usually found at the above temperatures, and its shape and vitality remain unchanged for several months. It thus ensures the continuance of the species even if the flour infested by *T. farinae* is stored under the driest possible conditions. If the air is moistened up to saturation, hypopus I is compelled to transform rapidly into the second-stage nymph, 24–48 hours being required between the first increase of moisture and the emergence of the nymph. Under the same conditions hypopus II also rapidly transforms into the second-stage nymph, but an increase of moisture is not always necessary for the change. An increase of temperature seemed to have this effect in one instance. In experiments on the influence of temperature 10 specimens of hypopus I were all dead after exposure for 32 hours to temperatures varying between —2 and —7°C. [28·4–19·4°F.] with an average of —4·5°C. [23·9°F.], whereas of 10 hypopi II 6 died and 4 transformed into nymphs. Hypopus II can change into the nymphal stage after exposure to temperatures of 9·6–32·5°C. [49·28–90·5°F.], the optimum being 25·5°C. [77·9°F.]. It is furthermore able to resist 34·4°C. [93·9°F.] for 14 days without injury. The maximum it can stand lies between 38 and 39°C. [100·4–102·2°F.]. At an average normal temperature without any special moisture hypopus II has lived for 9 months, and this is certainly not the limit of its vitality.

It is considered that the active hypopus (I) is the primary form, of which the non-mobile one (II) represents an adaptation to environment. All species of mites that live in particularly dry surroundings have an encysted hypopus. The media in which *T. farinae* lives are, as regards moisture, on the border line between the substances in which wind-carriage and those in which transportation by insects are of importance to mites.

Leonardi (G.). **Elenco delle specie di Insetti dannosi e loro parassiti ricordati in Italia fino all' anno 1911. II.** [Catalogue of harmful Insects and their Parasites recorded in Italy to the Year 1911. II.]—*Ann. R. Scuola Sup. Agric. Portici*, ser. 2, xviii, 80 pp. Portici, 1923.

This list gives the names of the plants attacked and the distribution and synonymy of the pests concerned.

Pinolini (D.). **Uno sguardo agli olivi.** [A Glance at the Olives.]—*Il Risveglio agric. Prov. Macerata*, no. 6, p. 48. Macerata, 1923. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, N.S. i, no. 4, p. 1117. Rome, October-December 1923.)

Growers in the Italian province of Macerata have found that the olive fly, *Dacus oleae*, can be driven away by treating the olive trees when in full flower with a mixture of equal parts of sulphur, powdered quicklime and sifted coal-dust. When the fruits have reached the size of small peas, spraying with Bordeaux mixture is very effective against fungi, and when repeated 40 days later, has also proved successful in checking *D. oleae*.

Aguiló y Gorsot (J.). **Una malatia nova dels tarongers de Catalunyae. La** *Pulvinaria floccifera*. [*P. floccifera*, a new Pest of Oranges in Catalonia.]—*Agricultura*, vii, no. 18, pp. 496–498. Barcelona, 1923. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, N.S. i, no. 4, p. 1122. Rome, October–December 1923.)

During the past 4 years a Coccid, recently identified as *Pulvinaria floccifera*, Westw., has been observed on orange plants in Catalonia. Its natural enemies are the larva of a Coccinellid, *Exochomus quadripustulatus*, L., and an undetermined Ichneumonid parasite. The scale has been controlled by spraying every month from May to October with a solution of 3½ parts lysol and 96½ water.

Mokrzecki (Z.). **Sprawozdanie z działalnosci Zakładów ochrony Lasu i Entomologji w Skierniewicach.** [Report of the Institute of Forest Protection and Entomology at Skierniewice, Poland.]—*Ecole sup. Agric. à Varsovie*, i, 1922–23, 32 pp., 11 figs. Skierniewice, 1923. [With a Summary in English.]

A great deal of damage has been caused in the virgin forest of Bialowies by the unusual abundance of *Ips typographus*, L., in 1922. Climatic conditions, the removal of infested timber and the use of trap-trees greatly reduced the numbers of the second generation. A study has been made of the predators and parasites of this pest. Of these the Anthocorid, *Piezostethus cursitans*, Fall., hibernates as a pupa in the burrows of *I. typographus*, feeding on the host pupae and adults in the spring. The larvae of *Lonchaea laticornis*, Mg., and *L. parvicornis*, Mg., feed on frozen young bark-beetles and the pupae, their entire development taking place in the galleries of the host. The larvae of *Bracon* sp., probably *B. flavator*, F., feed on the larvae of *I. typographus*, which however do not succumb until after they have prepared the pupal chamber. In this pupal chamber the parasite

builds its cocoon and hibernates. Other parasites of *I. typographus* are *Roptrocerus xylophagorum*, Ratz., which has two generations a year, *Pimpla alternans*, Grav., *Dendrosoter middendorfi*, Ratz., and *Cheiropachys tutela*, Wlk. Besides these the following insects were found in association with *I. typographus*: *Thanasimus* (*Clerus*) *formicarius*, L., *Pityophagus ferrugineus*, L., *Nudobius* (*Xantholinus*) *lentus*, Grav., *Philonthus sordidus*, Grav., *Ditoma crenata*, F., *Hypophloeus fraxini*, Kug., *Paromalus parallelepipedus*, Hbst., *Palloptera usta*, Meig., *Lauxania* sp., and *Medeterus signaticornis*, Lw.

Panolis flammea, Schiff. (*griseovariegata*, Goeze) is widely distributed over Poland; it is parasitised by *Ophion luteus*, L., *Ichneumon bilunulatus*, Grav., *Banchus femoralis*, Ths., and *Panzeria rudis*, Fll.

Other forest pests recorded are the Cerambycid, *Grammoptera ingrica*, Baeckm., and the Scolytid, *Crypturgus hispidulus*, Thoms. Special attention has been given to the study of *Aradus cinnamomeus*, Panz., which is injurious to young pine trees.

Among field pests *Phytometra* (*Plusia*) *gamma*, L., appeared to be of the greatest importance, occurring in the eastern provinces of Poland as well as in Little Poland (Galicia). A large number of the caterpillars were infected with flacherie and the fungus, *Botrytis tenella*; wherever the latter occurred, the second generation of adults did not appear.

PAILLOT (A.). **Le traitement d'hiver des arbres fruitiers.**—*Cultures fruitières*, ii, no. 9, pp. 161–162. Paris, 15th January 1924.

A formula that has been found very efficacious against Coccids on fruit trees in France, and that has at the same time controlled fungous diseases, consists of 2 lb. copper sulphate, 3 lb. flowers of lime (hydrated lime), 1 gal. anthracene oil, 0·8 oz. casein and 9 gals. water. The copper mixture (ordinary Bordeaux mixture) is made in the usual way; the casein and lime are then well mixed and a little water added; and the resulting calcium caseinate is then added to the copper mixture, the anthracene oil being emulsified into this liquid by adding it very slowly, agitating the mixture all the time. This emulsion can be used as a wash or spray, and has been found very successful against *Eulecanium* (*Lecanium*) *persicae*, *Epidiaspis piricola*, etc., on peaches, as well as against fungi; but the treatment should not be given later than February for fear of scorching the new shoots.

WILLAUME (F.). **Un puissant Insecticide: Le Pyrèthre.**—*Cultures fruitières*, ii, no. 9, pp. 166–169. Paris, 15th January 1924.

Pyrethrum, made from the extracts of *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium* is considered to be among the best insecticides, and might be the most economical if the cultivation of the plant in France were increased and facilities made for the manufacture of the product on the spot. The cultivation of the plant and preparation of the insecticide are described, and the author suggests, as improvements on the present methods, more intensive cultivation, the use of mechanical reaping-machines for the crop, simplification of the method of extraction, and better apparatus for applying the insecticide as a fine mist spray that would be at once very penetrating and thoroughly moistening.

FAES (H.). **Le phylloxéra en Valais et la reconstitution de vignoble.**— *Actes Soc. Helvétique Sci. nat., 1923*, pt. 2, pp. 42–55. Zermatt, 1923. [Received 21st January 1924.]

In Valais, where *Phylloxera* was first discovered in 1906, an important outbreak occurred in 1922, following upon the dry, hot summers of 1920 and 1921. In 1923, the position was somewhat reassuring, owing to a cold, moist summer in 1922, and the infested areas were less numerous. The influence of local climatic conditions in each year on the development of gallicolae is very great. It is not yet known how the gallicolae will develop in Valais, for this form has only occurred as the result of the importation of winter eggs on rooted plants from France. American stock is much more attacked by the gallicolae than European, but American vines are not all equally infested ; hybrids on their own roots are more or less infested according to the quality and quantity of the American strain in them.

Measures against *Phylloxera* are difficult under local conditions. As many of the vines are grown on steep slopes, deep trenches will have to be dug to prevent the carbon bisulphide from running down to the vines below, and owing to the light nature of the soil repeated injections will probably have to be made. It will be necessary to study the different varieties of stock and graft with a view to establishing the most resistant ones and the most suitable for Valais conditions. This question is discussed at some length.

GODET (C.). **Rapport sur l'activité de la Station d'essais viticoles à Auvernier, 1919–1921.**— *Ann. agric. Suisse*, xxiv, pp. 199–312. Berne, 1923.

In the section of this report dealing with insect enemies of the vine, the vine moth [*Clysia ambiguella*] is reported as being fairly abundant during 1920 and 1921. A combined spray of Bordeaux mixture and nicotine, containing 15 lb. of copper sulphate and 1 gal. of titrated nicotine per 100 gals. of mixture, was applied to the eggs of the moth, usually within 10 days after the principal flight of the moths, as determined by means of light traps. Other vine pests, including *Feltia* (*Agrotis*) *exclamationis*, did only minor damage. An attempt is being made to cultivate pyrethrum and to prepare the insecticide from it in the most economical manner.

FAES (H.), TONDUZ (P.), PIGUET (G.) & STAEHELIN (M.). **Les sels arsenicaux en agriculture.**— *Ann. agric. Suisse*, xxiv, pp. 315–338, Berne, 1923.

During 1921 and 1922 an effort has been made to determine by repeated and thorough analysis the amount of arsenic remaining on the skin and in the pulp of fruit after treatment with arsenicals. The methods and materials used and the technique employed in the analyses are described in detail. The conclusion is reached that arsenicals can be used with perfect safety if adequate precautions are taken. The sale, preservation and application of arsenical insecticides should be strictly regulated, and legislation should be made uniform for the whole of Switzerland. The value of arsenical treatment against insects feeding on leaves, stems and fruit has been definitely established.

Hoffmann (A.). **Un Insecte nuisible à la Rhubarbe (Col. Curculionidae).** —*Bull. Soc. ent. France,* 1923, no. 18, pp. 233–234. Paris, 1923.

Rhubarb, which is extensively cultivated in the Paris region, was severely attacked in 1923 by *Otiorrhynchus raucus,* F., which appeared in great numbers on the leaves and particularly on the young shoots. The larvae of this weevil are also able to live on the roots, though they do not reach to any great depth. Many insecticides were tried without much result, or else were found to be very expensive. A sprinkling of quick lime every few days seems to repel the insect, provided that it is carried out in the morning after a heavy dew or after rain. The lime seems also to have a beneficial effect on the plant.

Kieffer (N.). **Die Gallenreblaus, eine hierlands noch unbekannte Form der Wurzelreblaus.** [The Gall Vine Louse, a Form of the Root Vine Louse as yet unknown in Luxemburg.]—*Luxemburger Weinztg.,* xi, no. 24, pp. 332–335. Grevenmacher, 1st December 1923.

In Luxemburg the spread of *Phylloxera* is effected chiefly by man and subterranean animals such as mice, rabbits, etc. The gall-producing form, which is so important in the rapid spread of infestation, has not yet been found, and reproduction is parthenogenetic.

Ahlberg (O.). **Växthustripsarna.** [Greenhouse Thrips.]—*Medd. Centralanst. försöks. jordbruks.,* no. 233 (Ent. avdel. 38), 14 pp., 19 figs. Stockholm, 1922. [With a Summary in German.] [Received 19th January 1924.]

Three greenhouse thrips are known in Sweden. *Parthenothrips dracaenae,* Heeg., and *Heliothrips haemorrhoidalis,* Bch., are fairly common, while *H. femoralis,* Reut., has only been recorded twice. The morphology, biology and development of these species are briefly dealt with.

For fumigation hydrocyanic acid gas was very difficult to use owing to official regulations, and nicotine proved unsatisfactory, only a small number of the pests being killed. Nicotine sprays, however, gave excellent results, *e.g.,* 1 part of a 10 per cent. solution of nicotine sulphate in 60–100 parts water. As the eggs are not destroyed by such a spray, applications must be made at short intervals.

Lundblad (O.). **Körsbärs-eller plommonmalen (*Argyresthia pruniella* L.) ett svårt skadejur särskilt på körsbärsträden.** [The Cherry and Plum Moth, *A. pruniella.*]—*Medd. Centralanst. försöks. jordbruks.,* no. 247 (Ent. avdel. 39), 26 pp., 20 figs. Stockholm, 1923. [With a Summary in German.]

Argyresthia pruniella, L. (*ephippiella,* F.) is very common and often very harmful in southern and central Sweden. The caterpillar hatches very early in spring, and lives chiefly in the flower and leaf-buds of cherry, but may occur also on plum. The leaves and flowers are destroyed by it, but the cherries themselves do not appear to be attacked. Pupation takes place in the ground. Near Stockholm oviposition probably occurs before 1st August. The author has only found the eggs in small inequalities of the bark near the buds. They were never attached to smooth bark. As the moth has only one generation a year in Sweden and hibernates in the egg-stage, it is not likely that they are deposited on leaves that wither and are blown away.

Control is difficult, and all attempts to destroy the caterpillars have failed. A spray of 5 per cent. petroleum emulsion against the eggs, tested in 1923, reduced the percentage of attacked buds from 74 to 53. The best method of destroying the pupae consists in breaking up the ground beneath the trees and then stamping it down again.

MENZEL (R.). **Ondoelmatige** *Helopeltis*-**vangsten.** [The Importance of Supervising Catches of *Helopeltis*.]—*De Thee*, iv, no. 3, pp. 87–88. Buitenzorg, September 1923. [Received 11th January 1924.]

Attention is drawn to the fact that numbers of useful Hymenopterous parasites are often present in the batches of *Helopeltis* captured on tea plantations, and that this work requires careful supervising if it is to prove of value.

MENZEL (R.). **Over eene voor thee schadelijke mier** (*Acropyga acutiventris* **Roger).** [*A. acutiventris*, an Ant injurious to Tea.]—*De Thee*, iv, no. 3, p. 88. Buitenzorg, September 1923. [Received 11th January 1924.]

Injury to the roots of tea by *Acropyga acutiventris*, Roger, has been reported from West Java. In 1910 Roepke recorded this ant as harmful to coffee in the same manner and in both instances an Aphid was found in the underground nests. Roepke advised that the nests should be dug up and boiling water poured into them.

MENZEL (R.). **Over het voorkomen van een zeer nuttige parasietvlieg** (*Compsilura concinnata*, **Meig.**) **op Java.** [The Occurrence in Java of a very useful parasitic Fly, *C. concinnata*.]—*De Thee*, iv, no. 3, pp. 89–90. Buitenzorg, September 1923. [Received 11th January 1924.]

The Tachinid, *Compsilura concinnata*, Mg., has been obtained repeatedly from caterpillars of *Metanastria hyrtaca*, Cr., and *Thosea* sp. in Java. It probably parasitises other species also, and must have several generations a year.

MENZEL (R.). **Een geval van hyperparasitisme bij parasietvliegen (Tachinen).** [A Case of Hyperparasitism in Tachinid Parasites.]—*De Thee*, iv, no. 3, pp. 90–91. Buitenzorg, September 1923. [Received 11th January 1924.]

A Braconid, *Apanteles stauropi*, has been found parasitising *Stauropus alternus*, which infests tea, coffee, cacao, etc., in Sumatra. Parasitic Tachinid flies were also present, but they were themselves attacked by a Chalcid.

GARRETSEN (A. J.). **Engangs aangetast door een schimmel.** [Wasps attacked by a Fungus.]—*De Thee*, iv, no. 3, pp. 91–92, 1 pl. Buitenzorg, September 1923. [Received 11th January 1924.]

Wasps [*Polistes* sp.] occur in tea plantations and seriously interfere in the work of plucking. They have been noticed to be infected with a fungus, and though experiments in this connection were not possible, attention is drawn to the natural control thus effected.

HUTSON (J. C.) & JARDINE (N. K.). **Report on the Work of the Entomological Division.**—*Ceylon Administ. Repts. Dept. Agric., 1922,* pp. D 18–20. [Colombo, 1923.] [Received 11th January 1924.]

In addition to pests previously noticed [*R. A. E.*, A, xi, 313–316] the following are recorded by the senior author as occurring in 1922:—the bagworms, *Acanthopsyche hypoleuca, Clania variegata* and *Chalia doubledayi,* and the red slug, *Heterusia cingala,* on tea; *Batocera rubus* (stem and root borer) and *Saissetia hemisphaerica* (brown bug) on rubber; the leaf-hopper, *Niloparvata greeni, Spodoptera mauritia* (swarming caterpillar), the bug, *Podops scutellata, Schoenobius incertellus* (stem borer) and *Leptocorisa varicornis* (paddy bug) on rice; *Anomis* (*Cosmophila*) *erosa* (semi-looper) on leaves of young cotton, which was controlled by hand-picking and by the application of Paris green and the removal of alternative food-plants, of which the favourite was the Malvaceous weed, *Abutilon graveolens*; *Earias fabia, Sylepta derogata, Platyedra gossypiella, Dysdercus cingulatus* and *Saissetia nigra* (black scale) on cotton; *Odoiporus longicollis* (plantain weevil), *Hypsipyla robusta* (toona borer), *Terastia meticulosalis* (shoot borer), *Suana concolor* and *Taragama dorsalis* (leaf-eating caterpillars), a Pentatomid, *Cyclopelta siccifolia, Pseudococcus* sp. and *Aularches miliaris* (spotted locust), all on dadap (*Erythrina* sp.); a Coccid, *Ceroplastodes cajani,* on *Tephrosia candida*; and *Arbela quadrinotata* (bark-eating borer) and a bagworm, *Acanthopsyche* sp., on *Albizzia.*

JARDINE (N. K.). **Division of Plant Pests and Diseases Inspection (Central).**—*Ceylon Administ. Repts. Dept. Agric., 1922,* pp. D 20–21. [Colombo, 1923.] [Received 11th January 1924.]

A list is given of pests recorded during the year 1922 in the course of inspection of estates and gardens, with their food-plants; the more important of these are noticed in the preceding paper.

REEVE (A. T.). **Division of Plant Pests and Diseases Inspection (Southern).**—*Ceylon Administ. Repts. Dept. Agric., 1922,* pp. D 21–22. [Colombo, 1923.] [Received 11th January 1924.]

A survey of tea estates has been made, resulting in the drawing up of a schedule showing 61 estates and 21 gardens to be infested with shot-hole borer (*Xyleborus fornicatus*). This pest is evidently decreasing. New pests recorded on tea are *Eutermes* sp., *Calotermes greeni* and *Euschema palmyra,* termites apparently being the most dangerous pests of tea in the low-country. *Homona coffearia* (tea tortrix) was found on most estates, but not as a serious pest.

ANDREWS (E. A.). **Factors affecting the Control of the Tea Mosquito Bug.** (*Helopeltis theivora,* **Waterh.**)—*Trop. Agriculturist,* lxi, no. 6, pp. 367–369. Peradeniya, December 1923.

This paper is reprinted from the concluding part of a bulletin that has already been noticed [*R. A. E.*, A, xi, 274].

Mayné (R.). **Principaux ennemis des caféiers au Congo belge.**— *Ann. Gembloux*, xxix, no. 12, pp. 377–384, 2 pls. Brussels, December 1923.

The Longicorn, *Anthores leuconotus*, Pasc. (*Herpetophygas fasciatus*, Fhs.) is the worst insect pest of *Coffea arabica* in the Belgian Congo, *C. liberica* being attacked to a less extent. It is most injurious in regions having a long, dry season and at high altitudes. Its habits and the injury it causes are described [*R. A. E.*, A, x, 23]. After several consecutive seasons of attack, the plant rapidly dies ; if the attacks are not renewed, fresh roots may be thrown out and the plant may recover, or other insects or fungi may attack the tree through the holes made by the borers and thus cause its death. The ant, *Odontomachus haematodes*, L., devours the larvae in the galleries. Besides the remedial measures described [*loc. cit.*] it is suggested that the adults should be collected and destroyed when they appear on the trunks after emergence. Oviposition can be prevented to some extent by painting the crown of the plant (after rubbing it smooth) with wood tar, or with milk of lime mixed with Paris green.

Bixadus sierricola, Wht., closely resembles *A. leuconotus* and has frequently been mistaken for it [*cf. R. A. E.*, A, i, 22-24], but it occurs much less generally, and appears to be limited to the equatorial regions, being chiefly found in the deep forests. *C. liberica* seems to be the preferred food-plant, and only the parts of the plant above-ground are attacked, the insects being spread much more over the trunk. The remedies advised are the capture of adults as they emerge, when they can be collected on the trunk in the morning. As the galleries are easily accessible, a plug can be introduced soaked in paraffin and carbon bisulphide, the hole being closed immediately afterwards with a mixture of equal parts of coal tar and clay. If the crown of the plant has perished, it should be cut down and the surface painted with coal tar.

The Bostrychid, *Apate monacha*, F., is found throughout tropical West Africa and occurs on a number of plants in the Belgian Congo [*R. A. E.*, A, x, 23]. The damage seems to be done by the adults only. As the galleries are generally straight and large, the insect can easily be destroyed by a stiff wire, or, if the galleries are curved, in the manner described above with benzine, chloroform or carbon bisulphide.

Wilkinson (H.). *Antestia* **and Pests of Coffee.**—Typescript, 5 pp., Kampala, 9th August 1923. [Received from the Colonial Office, 16th January 1924.]

The author has made a tour in Uganda to study the depredations caused by *Antestia* on coffee [*R. A. E.*, A, vii, 405; x, 400]. In his opinion the fall of berries (except in the earliest stages) is caused by adverse weather conditions. Berries may be observed falling on estates where *Antestia* is absent. If attacked when very young the berries wither and die ; those attacked later show brown markings and may become mottled. The attack of the insect on the developing buds results in the production of masses of leaves and branches with short internodes, until the whole bush may present a matted appearance. These branches seldom, if ever, produce any crop until thoroughly pruned, and on such a tree pruning is very difficult. Any other kind of loss attributed to *Antestia* cannot be borne out by facts.

As many as 75 to 95 per cent. of the eggs collected were parasitised ; this percentage differs considerably at different periods of the year, but the importance of allowing as many parasites as possible to escape from collected eggs is obvious. In spite of difficulty in obtaining labour, collection of the insects and their eggs should be practised wherever possible ; as many as 30,000 adults have been collected in one day on part of one estate. It is most important to collect immediately before the March flowering and again immediately after pruning. Both the nature of the soil and the presence of shade are important factors in growing *Coffea arabica* ; strong and vigorous bushes growing on good soil were found to produce a profitable crop in spite of attack by *Antestia*, while shade is absolutely essential for growing this type of coffee under the best conditions. Although it is too early to pronounce upon the effects of shade on *Antestia*, little damage was caused where the crop was grown under shade. Thrips are also eliminated by this means, as they cannot live on the shaded bushes.

PATTERSON (W. H.). **Short Report on the San Thomé Cocoa Pest: A Warning to Gold Coast Farmers.**—*Dept. Agric., Gold Coast Colony*, 30 pp., 8 pls. Accra, 1923. [Received 17th January 1924.]

This is the report of a visit to San Thomé, made with the object of studying the depredations caused by *Heliothrips rubrocinctus* (cacao thrips) [*cf. R. A.E.*, A, viii, 492 ; ix, 58]. A large proportion of the young trees had died as a result of attack, and many of the older trees had become so weakened that they will require several favourable years for recovery. The immediate cause of the outbreak was drought accompanied by high temperature and wind, and intensified by excessive removal of forest trees. The necessity for conserving the remaining forests on the higher levels, and for planting windbreaks and shade trees throughout the cacao area is now understood. In the Gold Coast the potential danger from this thrips is very great, for the trees receive little attention, while in many places most of the shade trees have been removed.

Plants (Injurious Pests) Ordinance, 1923. No. 37, 7 pp. Accra, 28th December 1923.

This Ordinance for the treatment of plants and for the better prevention and treatment of pests injurious to plants in the Gold Coast repeals the Destructive Pests Ordinance, Cap. 98, and came into force 1st January 1924. No declared plant may be imported except at a port of entry, and no such plants or their wrappings, soil or containers, or any article packed with such soil or plants may be introduced without a licence. Inspectors have power to enter farms and prescribe treatment for the purpose of destroying or restricting the activities of any injurious pest. Plants attacked by any pest may not be removed from a farm except for certain specified reasons.

Bechuanaland Protectorate Locust Destruction Proclamation, 1923. No. 45, 2 pp. Pretoria, 21st September 1923.

Whenever locusts deposit their eggs or hoppers appear on any land, notice must be given to the Department that deals with the work of exterminating locusts. The occupier must himself at once take steps to destroy the hoppers, using material supplied free by the Department.

Birmingham (W. A.) & Hamilton (I. G.). **Diseases of the Cotton Plant.** — *Agric. Gaz. N.S.W.*, xxxiv, pts. 11 and 12, pp. 805–810 & 877–886, 12 figs. Sydney, November-December 1923.

In view of the increasing importance of the cotton crop in New South Wales the diseases to which it is liable are briefly reviewed. These are dealt with under bacterial diseases, those due to fungi, and root knot produced by *Heterodera radicicola*. The eradication of susceptible weeds and the practice of crop rotation are advocated in the case of infestations by *H. radicicola*.

Allen (W. J.). **Some Notes on Fumigation of Citrus Trees.** — *Agric. Gaz. N.S.W.*, xxxiv, pt. 12, pp. 897–898. Sydney, December 1923.

An extract is given from a report by H. J. Quayle on his experiments in fumigating *Citrus* with calcium cyanide. These have been dealt with at greater length elsewhere [*R. A. E.*, A, xii, 35]. He considers that hydrocyanic acid gas, regardless of the particular source from which it comes, is the only satisfactory treatment for red scale [*Chrysomphalus aurantii*, Mask.] on *Citrus*. Fumigation by means of calcium cyanide may be of particular value in New South Wales, as liquid hydrocyanic acid is not manufactured locally and cannot be transported by rail or water, while spraying with miscible oils does not effect complete control of *C. aurantii*.

Gurney (W. B.). **Insect Pests of the Present Season.** — *Agric. Gaz. N.S.W.*, xxxiv, pt. 12, pp. 905–907. Sydney, December 1923.

Against the larvae of *Heliothis obsoleta* and other Noctuids poison bran bait is recommended. If Paris green or bran are not available, the weeds or grass on which the caterpillars are feeding, or turnip, lucerne or potato tops may be cut up and dipped in a mixture of 1 lb. lead arsenate and 16 gals. water, or a 6 foot wide strip of the crop may be sprayed with this mixture.

The weevil *Listroderes* (*Desiantha*) *nociva*, is particularly injurious to young plants of many crops, including tomatos, potatoes, carrots and turnips. Lead arsenate or calcium arsenate applied as a dust to the bases of plants has given good results against this pest in the case of infested potatoes. Should a liquid spray be more convenient, it may be applied at the rate of 9 oz. lead arsenate powder or 1 lb. paste to 15 gals. water. The nozzle should be inserted at the base of the plants and the spray directed upwards as far as possible, so that the base of the plant and the lower surface of the leaves are covered.

The most common thrips in orchards in New South Wales is *Thrips tabaci*, the life-cycle from egg to adult occupying from 16 to 21 days in summer. This allows of many broods during a long summer, all stages being found on fruit trees within one flower at the same time. Preventive measures such as clean cultivation are most important. A winter spray of lime-sulphur may be applied just before the buds burst in the spring. When the blossoms are infested a tobacco wash should be used. It is possible that a kerosene emulsion might be added with advantage. Two or three applications may be necessary where the thrips are numerous, a thorough drenching of the blossoms being essential.

GIRAULT (A. A.). **Notes and Descriptions of Australian Chalcid Flies.— I (Hymenoptera).**— *Insecutor Inscitiae Menstruus*, xii, no. 1–3, pp. 1–9. Washington, D.C., January-March 1924.

The Chalcids described from Queensland include *Euplectrus seminigrifemur*, sp.n., from a Sphingid larva; *Buonapartea aeniceps*, gen. et sp.n., reared from the puparium of a Tachinid fly; *Syntomosphyrum teiae* reared from *Teia anartoides* and *Galeruca semiputella*; and *Ovidoencyrtus pallidipes*, gen. et sp.n., fromReduviid eggs. *Scutellista* (*Muscidea*) *cyanea*, Mot., is recorded from a Coccid.

WRIGHT (C. H.). **The Citrus Industry in Fiji.**— *Bull. Misc. Information, R. Bot. Gdns., Kew*, no. 7, pp. 261–264. London, 1923.

Orange and mandarin [*Citrus nobilis*] trees in Fiji are attacked to a limited extent by mealy-bugs and scale-insects and very seriously by the fruit-fly, *Dacus rarotongensis*, which also attacks guava, mango, grenadilla, dawa (*Pometia pinnata*) and kavika (*Eugenia malaccensis*). Oranges are apparently more liable to attack than mandarins, and citrus fruits generally are more susceptible late in the season. It is suggested that the authorities should erect, at ports of shipment, suitable sheds, having all openings covered with wire gauze; all fruits for export should be kept in these sheds for at least 5 days before being packed; and all fruit should be sorted and packed under Government supervision and be accompanied by a certificate that it had been held for 5 days in the sheds and that, in the inspector's opinion, it was free from fruit-fly and other diseases. It has been found that carefully selected fruit packed and shipped under these conditions early in the year can be landed in New Zealand free from fruit-fly.

WHITNEY (L. A.). **Reports of the Acting Chief Plant Inspector, July-September 1923.**— *Hawaiian Forester & Agriculturist*, xx, no. 4, pp. 155–161. Honolulu, October-December 1923.

The pests intercepted during July-September 1923 included: from California, *Pseudococcus gahani* on *Geranium*; *Chrysomphalus aurantii* on lemons; *P. maritimus* on pears; *Saissetia oleae* and *Coccus hesperidum* on unnamed plants; and peach twig borer [*Anarsia lineatella*] in peaches; from Ecuador, *Blattella germanica* on orchids; and *Pseudococcus* spp. on sugar-cane; from China, *B. germanica*, Dermestid larvae and *Cylas formicarius* on sweet potatoes; *Parlatoria zizyphus* on pomelos; *Pheidole* spp. on water chestnuts; and *Bruchus chinensis* in beans; and from Japan, *Bruchus pisorum* in dry beans.

PERKINS (R. C. L.). **The Control of Injurious Insects in the Hawaiian Islands by their Natural Enemies.**— *Trans. & Proc. Torquay Nat. Hist. Soc.*, iv, no. 1, pp. 23–31, 2 pls. Torquay, 1923.

This is a useful summary of knowledge respecting the many beneficial insects that have been introduced into Hawaii.

Experiments have also been carried out in these islands in connection with the introduction of insects to check the spread of certain noxious plants, such as *Lantana*. The most effective were found to be a fly, *Agromyza lantanae*, a Tortricid moth (*Crocidosema lantana*), two butterflies, *Thecla banzochii* and *T. echion*, two small plume moths (one described as *Platyptilia lantana*) and a Tingid bug, *Teleonemia lantanae*.

Ballou (H. A.). **Tropical Entomology.**—*Trop. Agriculture*, i, no. 1, pp. 5–6. Trinidad, January 1924.

This is a discussion of the value of economic entomology in tropical agriculture.

Work connected with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept. Dominica, 1922–23*, pp. 10–26. Barbardos, 1923.

The orange moth (which has not yet been identified) has been a pest for some years in Dominica, but no serious attempt has been made to control it. During 1922 it has been spreading in the interior and has also appeared on the coast lands, the damage reported being much greater than formerly. As yet its attacks are almost entirely confined to Washington navel orange. The habits of this moth greatly resemble those of the codling moth [*Cydia pomonella*, L.], and it is hoped that similar treatment may be effective in dealing with it, but further investigations are required before definite recommendations can be made.

de Azevedo Marques (A.). **Parasitas da videira.** [Pests of the Grape-vine.]—*Chacaras e Quintaes*, xxviii, no. 6, pp. 529–530, 1 fig. S. Paulo, 15th December 1923.

Coccids that infest the grape-vine in Brazil are *Aspidiotus rapax*, Comst., *Pseudaonidia tesserata*, d'Emm., and a new species, *P. marquesi*, Dr. Costa Lima's description of which is here quoted. Spraying with a solution of calcium polysulphide, 5° Bé., or with a 2 per cent. emulsion of kerosene-soap is advised.

Brittain (W. H.). **Methods employed in recording Results of Spraying and Dusting Experiments in Apple Orchards.**—*Scientif. Agric.*, iv, no. 5, pp. 141–151. Ottawa, January 1924.

During the past 6 years much experimental work has been carried out in the Annapolis Valley of Nova Scotia in orchard spraying and dusting [*R. A. E.*, A, xi, 394, etc.]. In this paper some explanation is given of the gradual development of the system that is now employed, and a few typical experiments are tabulated and the results discussed.

Munro (J. W.). **Canadian Forest Insect Problems.**—*Empire Forestry Jl.*, ii, no, 2, pp. 192–197. London, December 1923.

A general account is given of the more important insect pests occurring in Canadian forests [*cf. R. A. E.*, A, xi, 446], those dealt with being *Tortrix fumiferana*, Clem., *Monochamus scutellator*, Say, *Lygaeonematus* (*Nematus*) *erichsoni*, Htg., in connection with which the introduction of the parasite, *Mesoleius tenthredinis*, Morley, is discussed, and bark-beetles of the genus *Dendroctonus*.

The prevention of outbreaks of bark-beetles, whether in Europe, the Himalayas or Canada, is almost wholly a question of clean forestry, a view that was held by some authorities as far back as 40 years ago. One of the most important factors is the accumulation of large quantities of material suitable for food and breeding. The abnormal supply of such material may be produced in various ways, such as the result of felling operations or forest fires. In forest entomology the forest conditions should be studied as closely as the insect pests themselves.

Insect Pests.—*35th Ann. Rept. S. Carolina Expt. Sta. 1921–22,* pp. 37–44. Clemson College, S.C., December 1922. [Received 14th January 1924.]

Interest during the year 1922 was largely concentrated on the problem of controlling the boll weevil [*Anthonomus grandis,* Boh.], and experiments against it with calcium arsenate dust were carried out on a large scale. The results demonstrate that although the success varied at different places, there was a consistent gain in every place where the dust was applied. Each application materially reduced the weevil infestation, and even after dispersal of the weevils had begun, two applications considerably reduced their numbers. The sporadic nature of the infestations was remarkable, irregularities of occurrence being found even in the same field.

Boll Weevil Control.—*36th Ann. Rept. S. Carolina Expt. Sta. 1922–23,* pp. 18–29, 4 figs. Clemson College, S.C., December 1923. [Received 14th January 1924.]

During 1923 a boll weevil control division was inaugurated in co-operation with the Federal Department of Agriculture, and work was continued on a larger scale than before [see preceding paper]. A large number of proprietary mixtures and poisons advertised as remedies for the boll weevil [*Anthonomus grandis,* Boh.] were tested under screen cages. Many of the materials proved to be injurious to the plants, and some were more toxic to the plant than to the weevil. A note was made, however, of the more promising materials for test on a larger scale. It was found that before the squares formed, applications of either a sweetened poison made of calcium arsenate, treacle and water, or calcium arsenate dust, killed a large percentage of weevils in the field ; in some cases 80 to 98 per cent. of weevils were found dead 96 hours after the applications were made. The dry dust was more effective if applied while dew was on the plants. In no case, however, were weevils completely eliminated from fields by 3 or 4 applications of either liquid or dry poison in June. The indications are that when initial infestation is reduced to a minimum by means of these early applications, the time for mid-season and later applications of dust will be delayed ; little increase in yield of cotton was produced by the early applications alone. After the plants are large enough for blooming freely, the only means of reducing infestation is by the use of a dust cloud of calcium arsenate applied with a machine that thoroughly atomises the dry dust and drives the material down through the cotton plant. Liquid poison, applied later in the season, seemed to prevent rapid increase, but did not hold the weevil in check after the rains had started in mid-July. Detailed results on certain farms are recorded, showing that late applications (August and early September) were very successful, but the experiments will have to be repeated before a sound basis for recommendations for all kinds of seasons can be given. Of other poisons commonly used for various insects, nicotine gave the most promising results, a 2 per cent. dust giving as good results as one with higher nicotine content, while no injury was done to the plants ; these experiments, however, are not yet completed. Suitable machinery for dusting is discussed. Hibernation records showed that about 5 per cent. of weevils hibernating in woodlands survived the winter of 1922–23.

Campbell (R. E.). U.S. Bur. Ent. **Notes on Injurious Southwestern Tenebrionidae (Col.).**—*Ent. News*, xxxv, no. 1, pp. 1–7. Philadelphia, Pa., January 1924.

Tenebrionid beetles are becoming increasingly injurious in California, the adults feeding on the stems of young chillies and lima beans [*Phaseolus lunatus*] as they come out of the ground, or girdling the stems of tomatos and chillies after they are transplanted. The destruction of the native food-plants as a result of the increase of cultivated crops forces the beetles to feed on the latter. Notes are quoted from various writers on the injury caused by these beetles in different localities since 1912. The species concerned are *Blapstinus dilatatus*, Lec., *B. rufipes*, Csy., *B. coronadensis*, Blaisd., *B. elongatus*, Csy., *B. pimalis*, Csy., *Coniontis subpubescens*, Lec., *C. muscula*, Blaisd., *C. globulina*, Blaisd., and *Ulus crassus*, Lec.

Poisoned bran baits have proved successful against these pests provided the weather is not too dry. In laboratory tests spraying tomato foliage with lead arsenate and Paris green proved effective against *C. globulina*. In the San Francisco Bay region the young plants are protected by wrapping newspaper or tissue paper round the stems between the cluster of roots and the lowest leaf. In experiments in a field of bell pepper [*Capsicum grossum*] from 6 to 8 inches high, feeding was stopped by covering the ground immediately around the stem of the plant with fine dust such as lime, tobacco dust or kaolin. The soil was heavy so that the dust was able to penetrate it around the stems for half an inch or more. This treatment may be applied with a bellows duster.

Modification of Satin Moth Quarantine. Amendment No. 1 to Regulations Supplemental to Notice of Quarantine No. 53.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 1 p. Washington, D.C., 7th November 1923.

Certain towns and districts in New England are designated as areas infested with satin moth [*Stilpnotia salicis*, L.]. These areas may be extended or reduced as found necessary. This amendment to Notice of Quarantine No. 53 [*R. A. E.*, A, x, 596] became effective 15th November 1923.

Quarantine on account of Japanese Beetle. Revised Rules and Regulations Supplemental to Notice of Quarantine No. 48 (2d Revision).—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 5 pp. Washington, D.C., 17th November 1923.

These Regulations supersede those of 9th April 1923 [*R. A. E.*, A, xi, 426] and came into force 27th November 1923. The area under quarantine against *Popillia japonica*, Newm., in New Jersey and Pennsylvania is extended, and changes in the details of the regulations are made.

Modification of Fruit and Vegetable Quarantine. Amendment No. 2 to to Regulations Supplemental to Notice of Quarantine No. 56.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 4 pp. typescript. Washington, D.C., 18th January 1924.

An amended Regulation supplemental to Quarantine no. 56 [*R. A. E.*, A, xi, 518; xii, 14] is further amended as follows:—All fruit and

vegetables imported must be free from plants or parts of plants. Dried, cured or processed fruits and vegetables, nuts, dried beans, peas, etc., may be imported without a permit. Except as restricted as regards certain countries by special quarantines, bananas, pine-apples, lemons and sour limes may be imported with a permit. Grapes of the European or *Vitis vinifera* type and any vegetable, except under any restriction as regards certain countries, may be imported under permit at authorised ports on production of evidence that they are not attacked in the country of origin by injurious insects. Certain additions and exceptions are authorised to these fruits and vegetables for certain countries.

Marcovitch (S.). **Plant Lice and Light Exposure.**—*Science*, lviii, no. 1513, pp. 537–538. Garrison, N.Y., 28th December 1923.

In Tennessee the oviparous females of the strawberry root louse, *Aphis forbesi*, Weed, normally appear in November. When, however, the insects were subjected, a few days after the eggs hatched on 23rd February, to a short day of seven and a half to eight hours, and kept in a dark chamber for the remainder of the 24 hours, oviparous females appeared on 7th May, and eggs were deposited fifteen days later.

It was found experimentally that the migration of several species of Aphids is due to the relative length of daily exposure to light. Males and sexuparae of *Aphis rumicis*, L., *Capitophorus hippophaes*, Koch, and *A. sorbi*, Kalt., were produced experimentally in June by exposure of their summer food-plants to a short day for about seven weeks. Evidence, to be published shortly, was also obtained that the production of spring migrants in such species as *Aphis sorbi*, in which they may occur in any generation after the third, is governed by the increasing length of day of the spring months. The late appearance in *A. sorbi* of the spring migrants, which may give rise to a destructive outbreak, appears to be correlated with the length of day in relation to the time of hatching of the eggs.

Dodds (C. T.). **A new Salt Marsh Mealybug** (*Eriococcus palustris*, **n.sp.**)—*Jl. Ent. & Zool.*, xv, no. 4, pp. 57–60, 3 figs. Claremont, Cal., December 1923.

Eriococcus palustris, sp.n., is described from San Francisco Bay, where it was found on the saltmarsh cord-grass, *Spartina foliosa*. *Pseudococcobius clausseni*, Timb., parasitises a large percentage of this mealy-bug, generally killing the female before oviposition. Submergence for three or four days had no effect on the adult mealy-bugs, and they could float on the surface of fresh water for three weeks without dying.

Campbell (R. E.). U.S. Bur. Ent. **Notes on the Life History of *Dinapate wrighti*, Horn. (Col.).**—*Jl. Ent. & Zool.*, xv, no. 4, pp. 61–65, 1 pl. Claremont, Cal., December 1923.

Observations and rearings of *Dinapate wrighti* from an infested log of Washington palm (*Washingtonia filifera*) from the Colorado Desert have

amplified previous knowledge [*cf. R. A. E.*, A, x, 364, 451], and have led to the conclusion that there are probably two distinct broods and that the life-cycle of the beetle may vary from three to five years. It is certain that the period can be four years. Emergence seems to occur from late May to early September and oviposition may take place during this period and perhaps a little longer. The pupal period probably lasts about a month, and the adult may remain in a log for two weeks before it eats its way out.

WEHR (E. E.). **A Synopsis of the Syrphidae of Nebraska, with Descriptions of New Species from Nebraska and Colorado.**— *University Studies*, xxii, nos. 3 & 4, pp. 119–162. Lincoln, Neb., July & October 1922; also as *Dept. Ent. Contrib.*, 30, 44 pp. Lincoln, Neb., January 1924.

The contents of this paper are indicated by its title.

DAWSON (R. W.). **A Synopsis of the Scarabaeidae of Nebraska. (Coleoptera.)**— *University Studies*, xxii, nos. 3 & 4, pp. 163–244. Lincoln, Neb., July & October 1922; also as *Dept. Ent. Contrib.*, 31, 82 pp. Lincoln, Neb., January 1924.

Forty genera and 162 species are tabulated in this paper, and notes are given on their abundance, seasonal occurrence, and distribution within the State.

SMITH (C. M.). **Excretions from Leaves as a Factor in Arsenical Injury to Plants.**— *Jl. Agric. Res.*, xxvi, no. 4, pp. 191–194. Washington, D.C., 27th October 1923.

As it is possible for commercial brands of calcium arsenate to conform to the specifications of the U.S. Bureau of Entomology, and yet show irregularities in their physical and chemical properties and thus cause injury to plants, a study of this arsenical has been undertaken. The progress made in one phase of the study during the summer of 1922 is reported in this paper, the results being summarised by the author as follows :—Dew on upland cotton plants contains large quantities of salts that in laboratory tests so act upon calcium arsenate as greatly to increase the water-soluble arsenic content. That this is the cause of the erratic injury noted remains to be proved. What is true of the cotton plant may be true of other plants. Excretions from leaves, therefore, must be considered in explaining arsenical injury to plants. This factor may be of value in estimating the suitability of an arsenical for a particular purpose.

FRANK (A.). **Dormant Spraying.**— *Bi-mthly. Bull. Western Washington Expt. Sta.*, xi, no. 5, pp. 105–106. Puyallup, Wash., January 1924.

Recommendations are given for the best methods and materials for dormant spraying of fruit trees under Western Washington conditions.

Rand (F. V.) & Cash (L. C.). **Further Evidence of Insect Dissemination of Bacterial Wilt of Corn.**—*Science*, lix, no. 1516, pp. 67–69. Garrison, N.Y., 18th January 1924.

Experiments in 1922 with the brassy flea-beetle, *Chaetocnema pulicaria*, Melsh., and in 1923 with *C. denticulata*, Ill., have demonstrated that bacterial wilt of maize is directly disseminated from diseased to healthy plants through the agency of these beetles. This explains a large part of the mid-season spread of the infection, but leaves unexplained the sporadic cases of primary infection that appear early in the season and seem to originate from the plant itself. Observations and experiments, however, carried out with the twelve spotted cucumber beetle, *Diabrotica duodecimpunctata*, Oliv., make it extremely probable that such cases are due to this beetle. Infection from the soil does not seem to be a factor in producing the disease. As regards seed transmission, a maximum of only 2 per cent. of the plants grown from seed from diseased plants were themselves diseased. Seed transmission is, therefore, of restricted importance, except as a means of introducing the disease for the first time.

Ayers (E. L.). **Field Work, for the Year, in Florida on Insect Control.**—*Qtrly. Bull. State Plant Bd. Florida*, viii, no. 1, pp. 8–17. Gainesville, Fla., October 1923.

The Nematode, *Heterodera radicicola*, is found on almost all horticultural crops in Florida, though figs and peaches are the worst affected, and measures for its control are discussed [*R. A. E.*, A, x, 361; xi, 198, 504]. On *Citrus*, *Lepidosaphes beckii*, Newm. (purple scale), *Chrysomphalus aonidum*, L. (Florida red scale), and mealybugs, especially *Pseudococcus citri*, Risso, all did considerable damage in 1923. Oil emulsion sprays did not seem very successful against them, but 1 U.S. pint 40 per cent. nicotine sulphate with 10 lb. fish-oil soap to 100 U.S. gals. water proved quite effective, as also did a solution of 1 part lime-sulphur in 70 parts water. The gradual increase of the scale-eating caterpillar (*Laetilia coccidivora*, Comst.), and the fungus, *Entomophthora fumosa*, did much to reduce their numbers. Such insects as *Aspidiotus perniciosus*, Comst. (San José scale), *Aegeria* (*Sanninoidea*) *exitiosa*, Say (peach tree borer), *Conotrachelus nenuphar* (plum curculio) and *Coccotorus scutellaris*, Lec. (plum gouger) are important factors in limiting the production of deciduous fruit. A spray schedule for peaches is given, and the paradichlorobenzene treatment for *A. exitiosa* is explained [*R. A. E.*, A, viii, 189, etc.].

Phlyctaenia ferrugalis, Hb., was the cause of severe losses to celery growers. One of the best remedies for it was trapping the moths at light. Celery was also attacked by *Halticus citri*, Ash. (garden fleahopper), for which the most effective spray seemed to be kerosene emulsion, made by dissolving 1½ lb. soap in 3 U.S. gals. hot water, mixing in 3 U.S. gals. kerosene and diluting the whole with hot water to 50 U.S. gals. Calcium cyanide dust, applied with a power duster, produced a mortality of 70 to 80 per cent., but care must be taken to ascertain that the poison does not remain on the plants when they are used for food. The measures against *Empoasca mali*, LeB., have already been noticed [*R. A. E.*, A, x, 532], as well as those against *Frankliniella tritici bispinosa*, Morg. (Florida flower thrips) [*R. A. E.*, A, xi, 196], which, besides attacking beans, has in some instances done

severe damage to the foliage of young cotton and squash plants, while the berries of blackberries and strawberries have in places been entirely destroyed.

A spray schedule for pecans is given.

WATSON (J. R.). **The Pecan and Persimmon Borer.**—*Qtrly. Bull. State Plant Bd. Florida*, viii, no. 1, pp. 17–18. Gainesville, Fla., October 1923.

Pecans and persimmons are frequently attacked by the larva of a moth [? *Cossula magnifica*, Strecker], which makes a small hole in the centre of the tree and works up and down. A wad of cotton saturated in carbon bisulphide should be pushed into the hole and sealed up with wax or putty. The larva of a beetle [*Chrysobothris femorata*, F.] works just beneath the cambium and frequently girdles and kills young trees, attacking for preference newly transplanted or unhealthy ones. All cuts caused in pruning should be trimmed close and painted with white lead paint. The eggs are always laid on the sunny side of a tree, a sun scald being a favourite site. A board set up in front of the tree, or a wrapping of burlap on the trunk will often prevent injury. These borers should be cut out with a sharp knife. In the early spring, when the beetles are emerging, a trap consisting of a log of oak, pecan or hickory, may be placed in an orchard ; it should be burned before the winter.

Quarantine Department.—*Qtrly. Bull. State Plant Bd. Florida*, viii, no. 1, p. 27. Gainesville, Fla., October 1923.

The principal pests intercepted in Florida during the quarter ending 30th September 1923 were *Aleurocanthus woglumi*, Ashby (blackfly) and *Anastrepha fraterculus*, Wied. (West Indian fruit-fly) from Cuba, and *Pseudaonidia paeoniae*, Ckll., from South Carolina.

WADLEY (F. M.). **Factors affecting the Proportion of Alate and Apterous Forms of Aphids.**—*Ann. Ent. Soc. Amer.*, xvi, no. 4, pp. 279–303, 3 figs., 12 tables. Columbus, Ohio, December 1923.

Experiments on factors affecting wing production in Aphids were carried out from September 1919 to March 1920, and in December 1921 and January 1922 [*cf. R.A.E.*, A, xi, 496]. *Rhopalosiphum prunifoliae*, Fitch, was used throughout these observations, and the insects were reared on wheat grown in flower-pots, the general technique employed being described. General notes are given on the life-history and habits of this Aphid. In many cases, conditions after birth may cause divergence in development ; in others, previous conditions have determined the fate of the wings, but all observations appear to indicate that the fate of the wing pads is determined not later than the latter part of the second instar, and that after the second moult no change is produced by circumstances. It appears that winged agamic females of *R. prunifoliae* have a strong tendency to produce all apterous progeny and that wingless females produce a variable percentage of winged progeny. When conditions are favourable for the production of wingless Aphids, almost the entire progeny of both forms will be wingless, whereas if conditions favour the production of winged forms, the percentage of these will show only a slight increase in the progeny

of winged mothers but may approach 100 per cent. in the progeny of wingless mothers. It has not been possible to produce more than two successive winged generations, whereas 35 successive wingless generations were reared, and no preponderance of winged forms was noticed in the offspring at any time.

When all other factors influencing wing development were kept as constant as possible, temperatures from 80° to 70° F. resulted in a slow drop in the percentage of winged forms in the progeny of wingless individuals; below this the drop increased more rapidly, the percentage being very low at 65°, but at 62° there was a sharp increase. In the case of winged parents the percentage of winged descendants varies very little except at 62°, when a marked increase is shown. From March to December 1921 an apterous line was reared producing 30 generations, and though average temperatures below 60° occurred during several months, no preponderance of winged offspring was noted, and the wingless line was easily maintained throughout. It appears to be unlikely that a temperature below 60° would produce an increased percentage of winged individuals, as might have been expected from the results with temperatures between 65° and 60°.

In testing the effect of nutrition on the appearance of the different forms it was found that starved individuals that had become winged produced nearly all wingless young, just as other winged parents, whereas those that remained wingless produced many winged individuals. This was true in all cases whether starvation occurred early or late in development. Limited nutrition early in life caused a large number of the progeny of wingless individuals to become winged. The percentage of winged progeny was low with favourable nutrition. In the case of winged parents few of the progeny became winged even when starved. Those that had become winged as a result of poor nutrition produced nearly all wingless individuals, whereas those that remained wingless, in spite of starvation during development, produced almost entirely winged progeny, however well nourished. Wingless Aphids starved after maturity also produced winged progeny. Greater difficulty was encountered in producing winged Aphids by starvation at 65° than at any other temperatures.

In testing the effect of chemicals it was found that in general the substances that did not develop an unusual percentage of winged forms are such as might occur in the soil, while those that produced winged forms are not usual soil constituents, or, if present in quantity, are toxic to plants. The author considers the chemical factor, though interesting, to be too abnormal to be important in nature; but the other factors here considered are all important and must all be considered in experiments planned to test any one of them. Definite relations exist between them in their effect on wing development.

Other factors mentioned by some workers, such as the cyclic factor and the factor of varying strains, were not apparent in these experiments; the author was also unable to produce the true sexes or to find the factors that give rise to their appearance.

DeLong (D. M.). **The Distribution of the Leafhoppers of Presque Isle, Pa., and their Relation to Plant Formations.**— *Ann. Ent. Soc. Amer.*, xvi, no. 4, pp. 363–371, 2 pls., 1 fig. Columbus, Ohio, December 1923.

This is a discussion of the distribution of the various leaf-hoppers in relation to that of the different types of plants.

Entomology.—*36th Ann. Rept. Pennsylvania Agric. Expt. Sta. 1922-23*, Bull. 181, pp. 16–18. State College, Pa., September 1923.

The life-history studies of the various insect pests have been continued along the lines previously noticed [*R. A. E.*, A, xi, 253].

Two important parasites of *Phorbia brassicae*, Bch. (cabbage root maggot), *Baryodma ontarionis*, Casey, and *Cothonaspis gillettei*, Wash., have been reared from the pupae.

Kelsall (A.) & Campbell (J. H.). **The Inhalation of Arsenical Insecticide Dusts.**—*Scientif. Agric.*, iv, no. 5, pp. 159–161. Ottawa, January 1924.

Owing to the increasing use of dusts containing arsenic, an investigation has been made to determine the possibility of injury to those engaged in the work of dusting. A dust respirator of the sponge type was worn by the operator for a definite time, and the amount of arsenic in the sponge was then computed. It was found that from $\frac{1}{2}$ to $\frac{2}{3}$ of the arsenic inhaled was later expelled with the nasal exudate; but a person working for 10 hours under normal dusting conditions such as are described in the paper might inhale and retain within the system from ·005 to ·02 grammes of arsenious oxide. Taking 13 grammes as representing fairly accurately a dangerous dose of arsenic, it is evident that workers taking no precautions against the dust may retain from $\frac{1}{25}$ to $\frac{1}{7}$ of a dangerous dose in a working day of 10 hours. This amount, although not approaching danger point, is considered nearer to it than is desirable, and it is therefore suggested that, while it seems unnecessary for persons working under dust conditions for an occasional hour or two to take any special precaution against the dust, those working more or less continuously with arsenical dust should wear a dust respirator as much as possible, and breathe through the nose and not through the mouth when the respirator is removed. Immediately on leaving the work, dusty clothing should be taken off and the hands and body cleared of the dust.

Haywood (J. K.) & Smith (C. M.). **A Method for Preparing a Commercial Grade of Calcium Arsenate.**—*U.S. Dept. Agric.*, Dept. Bull. 750, 10 pp. Washington, D.C., September 1923.

This is a revised form of a bulletin previously noticed [*R. A. E.*, A, vii, 188].

Spanish Grapes prohibited Entry on account of Fruit Fly Investigation.—*U.S. Dept. Agric. Press Service*, Washington, D.C., 18th January 1924. 5 pp. multigraph transmitted from Colonial Office, London, 21st February 1924.

Owing to the discovery of larvae of *Ceratitis capitata* (Mediterranean fruit-fly) in Malaga grapes from Almeria, Spain, sent for entry into the United States, the regulations supplemental to notice of Quarantine 56 [*R. A. E.*, A, xi, 518; xii, 14] have been further amended (effective 18th January 1924) to provide that grapes of the European or Vinifera type may be imported only upon the presentation of evidence satisfactory to the United States Department of Agriculture that such grapes are not attacked in the country of origin by injurious insects, including fruit-flies.

No suspicion has hitherto been entertained that the Malaga grape is subject to attack by *C. capitata*, and there seems to be no previous record of such infestation. Grapes in general have seemed rather immune from attack by this pest, and even in Hawaii, where it is abundant on a variety of fruits, the grape class has apparently remained free, and has therefore been permitted entry under Quarantine 56, although inspection has been maintained. Immediately upon the discovery of its presence, an emergency conference was called, on 27th November 1923, and the force of inspectors at New York was increased to 10. Of some 198,425 barrels of grapes offered for entry subsequent to the conference, about 1 barrel in 15 was examined. This resulted in the finding of infested grapes from 129 different vineyards in Almeria, representing some 4,337 barrels of grapes, all of which were refused entry. At the close of the conference a report was drawn up and distributed, and certain protective measures were suggested, particularly with relation to the burning or disinfection of the ground cork in which the grapes are packed and which might contain larvae in various stages of transformation. A formal conference was held on 4th January, at which the Spanish Embassy and the leading interests concerned were represented, as well as experts from the Department of Agriculture and representatives from some nine States. The general status of infestation was reported, and, although it was slight from the point of view of the consumer, in one instance 29 larvae had been taken from a single bunch of grapes, and upwards of 200 larvae were found in the barrels from the 129 infested vineyards, this proportion indicating a possible content from the total rejected barrels of 29,000 larvae. The infested vineyards were found to be fairly evenly distributed throughout the Province of Almeria (where the Malaga grapes are grown), so that risk was attached to the entry of any of the grapes, whether infestation had actually been discovered or not. The failure to note infestation of these grapes during the long period of years in which they have been an important article of import may indicate that infestation in Almeria is of recent origin, and in that case the risk in future importations would be greater than in the present year. The enormous values of the investment in fruit and vegetable production in the United States makes it imperative that no further risk should be taken. The fact that the infested grapes show no exterior sign of attack, and are, on the contrary, generally superior in appearance, points to unusual efficiency in the system of inspection.

HOWARD (L. O.). **Retarded Establishment of Introduced Parasites of Injurious Insects.**—*Proc. Nat. Acad. Sci. U.S.A.*, x, no. 1, pp. 16–18. Washington, D.C., January 1924.

It is pointed out that though the establishment of an introduced parasite of an existing insect pest may appear to have failed, it may in fact only have been retarded. Thus for instance *Scutellista cyanea*, Mot., and *Pleurotropis epigonus*, Wlk., though introduced over 20 years ago, have only recently been recovered. *P. epigonus* has now become the common parasite of the Hessian fly [*Mayetiola destructor*, Say] throughout Maryland, Pennsylvania, New Jersey and New York, and *S. cyanea*, originally introduced in 1898 against *Ceroplastes* sp. (wax scale), has now been recovered in Louisiana as a parasite of the black scale [*Saissetia oleae*, Bern.].

GODFREY (G. H.). **The Eelworm Disease ; a Menace to Alfalfa in America.**—*U.S. Dept. Agric.*, Circ. 297, 8 pp., 4 figs. Washington, D.C., October 1923.

The Nematode, *Tylenchus dipsaci*, is the cause of serious loss wherever lucerne is grown, its presence acting as a stimulus that causes swellings and abnormal development, and robbing the plant of its power to produce a strong growth. Finally the Nematodes become so abundant as to kill the plant, when they leave it and migrate into the soil until they reach another. Their presence can easily be detected if a survey is made 2 or 3 weeks after the new growth has obtained a good start following a cutting, when infested plants can be recognised by their poor condition and colour. The disease is spread chiefly in autumn, winter and early spring, and can be carried long distances by irrigation water or by hay [*cf. R.A.E.*, A, xii, 33].

MIDDLETON (W.). **The Imported Pine Sawfly.**—*U.S. Dept. Agric.*, Bull. 1182, 21 pp., 8 figs. Washington, D.C., 12th December 1923.

Much of this information on *Diprion simile*, Hartig (imported pine sawfly) has been noticed from previous papers [*R.A.E.*, A, vi, 460, etc.] ; it is here given in more detailed form. The author has proved, contrary to the findings of some previous workers, that *Pinus sylvestris* is a favoured food-plant and is capable of supporting the insect through all its stages ; several other American pines have also proved to be suitable food-plants, so that the insect is likely to become established in the forests of the United States.

ANNAND (P. N.). **A new *Chermes* from Pine. (Hemiptera, Aphidae.)** —*Canad. Ent.*, lvi, no. 1, pp. 5–6, 1 fig. Orillia, Ont., January 1924.

The apterous female of *Chermes armiger*, sp. n., on *Pinus monticola* is described from Idaho.

SAVASTANO (G.). **Consigli all'arboricoltore.** [Advice to the Arboriculturist.]—*R. Staz. sperim. Agrum. & Fruttic.*, Boll. 46, 7 pp. Acireale, March 1923. [Received 25th January 1924.]

Practical notes are given on the measures to be taken against the scale [*Chrysomphalus dictyospermi*, Morg.], *Cydia* (*Carpocapsa*) *pomonella*, L., and *Hyponomeuta malinellus*, Z., in Italy.

SAVASTANO (L.). **Manipolazione della poltiglia solfo-calcica (formola della Stazione di Agrumicoltura) e suo uso. 4a edizione.** [The Preparation and Use of the Lime-Sulphur Spray made to the Formula of the Citrus Station of Acireale. 4th edition.]—*R. Staz. sperim. Agrum. & Fruttic.*, Boll. 47, 7 pp. Acireale, June 1923. [Received 25th January 1924.]

In this revised edition [*cf. R.A.E.*, A, iv, 158] the following modification is recommended in spraying. The first application should be made with the usual straight nozzles, but bent ones with downward jets should be used for the second, to ensure that the upper surfaces of the leaves are wetted, because the citrus scale [*Chrysomphalus dictyospermi*] prefers the sun.

FAURE (J. C.). **Observations biologiques sur** *Hemiteles areator* **Grav.**—*C. R. Soc. Biol.*, lxxxix, no. 37, pp. 1301–1302. Paris, 1923.

The author describes the method of feeding of the female of *Hemiteles areator*, Grav., on its host, *Apanteles glomeratus*, L.; it resembles that of *Pteromalus variabilis*, Ratz., which is also a parasite of this Braconid.

FEYTAUD (J.). **Le Disparate ou Spongieuse,** *Lymantria dispar*, **L.**—*Rev. Zool. agric. & appl.*, xxii, no. 9, pp. 237–246, 1 fig. Bordeaux, September 1923.

A general account is given of *Porthetria* (*Lymantria*) *dispar*, L. (gipsy moth).

FAURE (J. C.). **Sur trois Microlépidoptères rencontrés sur le pêcher.**—*Rev. Zool. agric. & appl.*, xxii, no. 9, pp. 250–252. Bordeaux, September 1923.

Peach trees in the Rhône Valley are frequently attacked in spring by the following Lepidopterous larvae, though observations indicate that very little harm is done by them. *Stenolechia albiceps*, Z., webs over the leaves at the end of the young shoots in the latter half of April, but the terminal bud remains intact and continues to develop. Pupation occurs under the bark, and the adults appear in the last fortnight of June. These caterpillars are also found on apricot, cherry, pear and apple, as well as on elm and hazel. *Hypsilophus* (*Cerostoma*) *persicellus*, F., eats holes in the leaves, often before they have expanded, at the beginning of May. Pupation generally occurs at the end of May on the leaves or branches, and the larvae are never very abundant; they are probably only accidental feeders on peaches and also attack cherry and almond. The parasites reared from them were the Tachinid, *Arrhinomyia tragica*, Meig., which pupates in the host larva, and the Hymenoptera, *Lissonota linearis*, Grav., and *Triclistus congener*, Hlmg. *Tortrix* (*Cacoecia*) *rosana*, L., tunnels in the fruit of peaches, and is frequently confused with *Cydia* (*Laspeyresia*) *molesta*, Busck, a much more dangerous pest.

DE RATHSAMHAUSEN (J.). **Les Maladies des Abeilles. vii. Les centres de recherches.**—*Rev. Zool. agric. & appl.*, xxii, no. 9, pp. 252–257. Bordeaux, September 1923.

In this instalment of his work on bee diseases [*R.A.E.*, A, xi, 479; xii, 95] the author discusses the work and the value of research laboratories, which are badly needed in France for their study.

DIEUZEIDE (R.). **Les Rapports entre les Champignons et les Insectes.**—*Rev. Zool. agric. & appl.*, xxii, no. 10, pp. 282–289. Bordeaux, October 1923.

In the present paper the saprophytic and symbiotic interrelation between fungi and insects is discussed, the previous literature on the subject being reviewed. The information is arranged under the orders of the insects dealt with.

Hooper (C. H.). **The Value of Hive and Wild Bees in the Production of Fruit.**—*Paper read before the Ashford Branch of the Kent Beekeepers' Assoc.*, 1st November 1923. 24 pp.

As a result of some years' observations of the insects visiting flowers [*cf. R.A.E.*, A, x, 391] the author concludes that no other insects are nearly so valuable as bees in assisting pollination of fruit trees, etc. Both hive bees and bumble-bees are diligent carriers of pollen, as also are some wild bees (*Andrena* and *Halictus*). The former begin to work early in the spring before many other insects are about. Bees will fly a mile or so from their hives on warm, sunny days, but on cold or cloudy days they limit themselves to a range of about 100 yards; they visit only one sort of flower on each journey from and to the hive. This is of especial value in the case of apples, pears, plums and cherries, the majority of which are self-sterile, so that both pollination and cross-fertilisation may be effected by the bees. The records of insect visits to various kinds of fruit trees are given, with definite figures showing increased yield of fruit due to bees.

Speyer (E. R.). **Woodlice in Glasshouses.**—*Jl. Minist. Agric.*, xxx, no. 11, pp. 1042–1047, 5 figs. London, February 1924.

Some of the information here given has been already noticed [*R.A.E.*, A, xi, 351].

Armadillidium speyeri, Jackson, and *A. pictum*, Br., are practically confined to cucumber houses, and *A. vulgare*, Latr., is more often found in the cooler tomato houses, in peach houses, and in the nests of ants. Two other species of woodlice, *Porcellio laevis*, Lat., and *Haplophthalmus danicus*, B. Lund, are common in tomato houses, but do little damage. Breeding occurs from early spring to August; at the approach of winter, *A. vulgare* buries itself deep in the ground and becomes inactive; the species in cucumber houses remain more or less active unless they are turned outside when the borders are cleared from the houses, in which case they bury themselves until the spring and then return to the houses. Seedlings in boxes are frequently bitten through the stems at the soil level, and after the plants are potted out holes are eaten in the lower leaves, the cotyledons often being entirely destroyed. *A. speyeri* may do considerable damage by eating the petals of carnations, and *A. vulgare* often removes the bark from peach trees, both species feeding at night.

During the winter, hot water treatment can be used very effectively; woodlice dipped for half a second in water at 149° F. died within a few minutes. Soil with an internal temperature of 146° F. and a surface temperature of 124°F. killed all woodlice placed on the surface in 30 seconds, while at an internal temperature of 136°F. and a surface temperature of 108°F. all were killed within 2 minutes. If hot water treatment is not possible, the soil, walls and woodwork of the houses may be sprayed with 1 gal. cresylic acid (pale straw 97–99 per cent.) with 8 lb. potash soft soap and ½ lb. pure naphthaline, 2 pints of this mixture being used to 12 gals. of water. Two days after this treatment 99 per cent. of the woodlice in one house were found dead. For summer treatment many baits have been tried with more or less success, but by far the most successful, both in cucumber and tomato houses, are red beets or mangels, which should be cut in half and placed face downwards on the soil, one half to every four plants. The woodlice

collecting on these should be shaken into a pail of hot water each morning. Red beets will remain effective from 6 weeks to 2 months and mangels not so long. Inverted pots containing straw, especially if glucose be added, will prove a successful trap in limited areas.

ROEBUCK (A.). **Destruction of Wireworms.**—*Jl. Minist. Agric.*, xxx, no. 11, pp. 1047–1051. London, February 1924.

From 1914 to 1922, a study was made of the numbers of wireworms in arable land. Though no special treatment was given to any of the fields nor any insecticidal dressing used, a gradual reduction under cultivation of the numbers of wireworms in the original pasture was very noticeable. They were found to be approximately four times as numerous in grass as in arable land, and in general they were more abundant in the lighter soils. On grass land they were near the surface, the majority in the top inch of soil, a few below 3 in., and very few below 6 in. There was no evidence of any movement downwards during cold weather. On arable land they apparently avoided the dry loose surface and were most numerous at a depth of 3 or 4 in., frequently at 6 in., but rarely below 9 in. A table shows the reduction in the estimated numbers when grass land was ploughed up and kept under cultivation for a number of years. A continuous and rapid fall in the wireworm content is noticeable, especially after the first year under cultivation. A total of 200,000 wireworms to the acre is considered the utmost limit of safety as regards damage to crops. From 100,000 to 200,000 is tolerably safe for cereals, broadcast crops, established plants, or vigorous rooted crops. Below 100,000 little damage need be feared, and below 50,000 it is negligible.

Five years' cultivation is sufficient to reduce the wireworms in ploughed pastures to unobjectionable proportions. As they live in the soil on an average through 5 winters, one-fifth normally become adults each year, and if these can be prevented from ovipositing the most serious infestations will be eliminated in 5 years. Such birds as rooks and lapwings, as well as poultry run on the fields during tilling, all help in reducing the numbers. Intensive cultivation considerably shortens the period of elimination.

Of cereal crops, oats proved by far the most satisfactory on wireworm-infested land, barley the least, and wheat intermediate. Rye was not tested sufficiently for an opinion to be formed. Beans are a safe crop, but should not be sown thinly; peas also are safe on their particular soils, but only if broadcast. Potatoes usually grow well, but a proportion of the crop may be spoiled by the insects and cannot be marketed. Swedes, turnips and mangels are liable to serious damage, and the crops may be further damaged by rooks searching for the insects. Of the cabbage group, kales are the best for growing on infested land, as they can be left unthinned and still produce abundant foliage. Linseed was never damaged.

FRYER (P. J.). **Successful Spraying.**—8vo, 154 pp., 82 figs. London, Ernest Benn Ltd., 1923. Price 7*s.* 6*d.* net.

This handy volume, intended for the use of growers, nurserymen, horticulturists, gardeners, and amateurs in Britain, presents a concise and simple guide to the principles underlying the important subject of spraying, without attempting an exhaustive treatise on the insect

and fungous enemies of fruit, for which the author refers his readers to his former manual [*R.A.E.*, A, viii, 404]. The fifteen chapters comprising the present volume deal with the following subjects, among others: Spraying efficiency; the factor of water supply (including the utilisation of "hard" waters); subterranean pests; and a brief discussion of modern methods and machinery. The chemical aspects of the subject are treated in a succinct, direct manner, and the work is well illustrated by original photographs.

FREW (J. G. H.). **On the Larval Anatomy of the Gout-fly of Barley (*Chlorops taeniopus* Meig.) and two related Acalyptrate Muscids, with Notes on their Winter Host-plants.**—*Proc. Zool. Soc. Lond.*, 1923, pt. 4, pp. 783–821, 23 figs. London, December 1923.

The external and internal anatomy of the mature larva of *Chlorops taeniopus*, Meig., is described in detail, the puparium and egg being also dealt with. The third larval instar and puparium of *Meromyza nigriventris*, Mcq., and *Balioptera combinata*, L., are compared with the corresponding stages of *C. taeniopus*.

In studying the winter food-plants of these flies, a number of grasses were examined, a list of which is given. *C. taeniopus* has only been found on *Agropyrum repens* among the wild grasses examined, but *M. nigriventris* occurs on *A. repens*, *Festuca ovina* and *Alopecurus pratensis*, and *B. combinata* on *A. repens*, *F. elatior*, *Lolium perenne*, *Holcus lanatus* and *Agrostis alba*. All three species attack winter barley and wheat. The injury caused by *M. nigriventris* and *B. combinata* is similar to that caused by the frit fly, *Oscinella* (*Oscinis*) *frit*, L. The winter is passed in the larval stage, pupation occurring in the spring.

Chloropisca glabra, Meig., was bred in considerable numbers from various grasses, and has also been found in winter wheat and barley. Owing to the great resemblance of the larva of this species to *O. frit*, a description of it is deferred until a detailed comparison of the two larvae can be made.

HIRST (S.). **On some New or Little-known Species of Acari.**—*Proc. Zool. Soc. Lond.*, 1923, pt. 4, pp. 971–1000, 24 figs. London, December 1923.

Among the many species dealt with, *Paratetranychus indicus*, sp. n., is described from Coimbatore, where it is sometimes a serious pest of cholam (*Sorghum*); it is found in large numbers on the lower surface of the leaves, the attacked portions turning bright red. *Tarsonemus translucens*, Green, has already been recorded as occurring on tea in Ceylon and India and on *Capsicum* in Trinidad; it is now recognised to be the cause of "Murda" disease of chillies, and "Tambera" disease of potatoes in India [*R.A.E.*, A, x, 236]. *Pseudotarsonemoides spinitarsus*, sp.n., was found on the larva of *Scolytus destructor* (elm bark-beetle) at Kew.

The author points out that *Tetranychus crataegi*, Hirst, has priority over *T. viennensis*, Zach., and not *vice versa*, as stated by Zacher in a previous paper [*R.A.E.*, A, x, 259].

Nalepa (A.). **Die Gallmilben-Gattung** *Oxypleurites* **Nal.** [The Gall-mite Genus *Oxypleurites*, **Nal.**]— *Verh. Zool.-Bot. Ges.*, lxxii (1922), pp. 14–22. Vienna, 1923.

The seven European species of this genus of mites, which are mostly from forest trees, are described, and a key to them is given.

Lindner (E.). **Diptera.**—*Biol. Tiere Deutschlands*, Teil 38, pp. 1–40, 36 figs. Berlin, 15th June 1923. [Received 28th January 1924.]

This paper on Diptera is a section of a general treatise on the biology of the fauna of Germany [*R. A.E.*, A, xi, 199]. The salient points of interest in the morphology, development and habits of Diptera are illustrated by references to various species, including some that are of agricultural and medical importance.

Bischoff (H.). **Hymenoptera.**—*Biol. Tiere Deutschlands*, Teil 42, pp. 1–156, 33 figs. Berlin, 10th November 1923.

This is a further part of the work referred to in the preceding paper. The same mode of treatment is adopted, but instead of dealing with the order as a whole, the families are taken separately.

Hänsel (S.). **Beitrag zur Kenntnis der Biologie des Getreidehähnchens** *Lema cyanella* **Lin.** [A Contribution to the Knowledge of the Biology of *L. cyanella*].—*Zeitschr. wiss. Insektenbiol.*, xix, no. 1, pp. 27–29, 7 figs. Berlin, 31st January 1924.

The Phytophagous beetle, *Lema cyanella*, L., has been recorded from Great Britain, Central Europe and Russia. It is of less economic importance than *L. melanopa*, and very little is known of its life-history. The author has found the larva in Germany up to mid-June on barley, oats, rye and wheat. It feeds in the morning and evening. The cocoon is formed of a white quick-hardening secretion from the mouth, and is usually placed on an upper leaf-surface and very rarely between the ear awns. The pupal stage lasts about 3 weeks. As the larvae and pupae of *L. cyanella* and *L. melanopa* are very similar, attention is called to the fact that the latter pupates in an earthen envelope underground.

Roman (A.). **Ichneumonologische Notizen.**—*Ent. Tidskr.*, xliv, no. 3–4, pp. 169–174, 1 fig. Stockholm, 1923.

Two Ichneumonids of economic importance described here are *Angitia punctoria*, sp. n., bred in 1921 in the south of France from the maize pest, *Pyrausta nubilalis*, and *Holocremna obscura*, sp. n., which occurred in 1919 in Sweden on the occasion of an outbreak of *Lyda* [*signata*, F.] [*R. A.E.*, A, xii, 99].

The Organisation of the Campaign against Locusts in French West Africa.—*Internat. Rev. Sci. & Pract. Agric.*, N.S. i, no. 4, pp. 823–837, 2 figs. Rome, December 1923.

As a result of the International Agreement in 1920 for combined action against locusts in North Africa [*R. A.E.*, A, ix, 490], a network of posts was established in French West Africa, from which information is transmitted to the Crop Protection Service of Algeria.

Most of the information given here, however, is the result of an enquiry instituted in 1919 throughout French West Africa in order to obtain as concise and accurate information as possible respecting the migrations and life of the insects and to serve as a guide for measures to control them. In Mauritania generally the advent of the locusts coincides with the rainy season (June-July), damp sand being preferred for oviposition. As most of the locusts are hatched in the vast uninhabited tracts, the measures taken in some isolated localities do little to decrease the danger of invasion. Records of the invasions in Senegal since 1892 are given. In the Sudan *Schistocerca tatarica** has done great damage every year since 1897 with a few exceptions. From 1899 to 1902 the grey locust, *Locusta* (*Pachytylus*) *migratoria* ph. *migratorioides*, was also very injurious. The sandy soil of the Sahara zone together with the moderate rainfall seem to favour the spread of the nymphs of *Schistocerca*, their progress being arrested in the Sudan, along a line that varies according to the season, by the heavy rainfall and excessive damp. In the territory of the Niger no large invasions of crop-destroying locusts seem to have occurred until the end of the last century. Since 1890, no year has passed without swarms small in size in the vicinity of the Niger but increasingly larger and denser eastwards. In the eastern part of the territory (between the Chad territory and a line following approximately the meridian of the 10th degree of east longitude) the largest swarms occur. In the western part (comprising a strip about 60 miles wide parallel to the river) small swarms arrive in February and March, and as no crops or grass are then available they quickly disperse and disappear as soon as the heat sets in. In the central zone, which forms the largest part of the territory, there are two annual invasions a year, one occurring before and the other after the rainy season. The second is the more serious, as crops, mostly ripe millet, stretch from the Chad to the Niger.

A thorough study of locusts over the whole of Africa is necessary to determine the general rules governing their migrations.

VIVET (E.). **Dégâts causés par les parasites de l'artichaut.**—*Rev. agric. Afr. Nord.*, xii, no. 233, pp. 35–37. Algiers, 18th January 1924.

Artichokes, which have been cultivated to a much greater extent than formerly in Algeria, are seriously damaged by the larvae of *Gortyna* sp., which mine within the stem up to the head of the plant, causing this to wither and die. Two-year-old plants are chiefly attacked. Growers in some cases have been barely able to cover the cost of cultivation owing to the losses from this moth and from the Aphids that frequently infest the already weakened plants. Against *Gortyna* arsenical sprays should be used on the leaves before the heads have formed, and nicotine solutions are recommended against the Aphids.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, viii, no. 1, pp. 6–7. Pretoria, January 1924.

Damage to sweet potatoes by a species of *Cylas* is recorded from Zululand, and inquiries are being made to ascertain the history and extent of the infestation. The Argentine ant [*Iridomyrmex humilis*, Mayr] is reported from Port Elizabeth as a house pest. A locust,

* The insect referred to under this name is *S. gregaria*, Forsk.—Ed.

Orthocanthacris moesta, Serv., has been causing serious damage to fruit trees in the Orange Free State, western Transvaal and northern Cape Province.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xx, pt. 6, pp. 454–455. Brisbane, December 1923.

The work in connection with paradichlorobenzene against *Lepidoderma albohirtum* is being continued. Experiments indicate that ¼ oz. injections put in about the middle of January would kill all grubs present in the soil by the end of the month, and that much less might be effective ; it is thought that this may not exceed 90 lb. per acre.

Carbon bisulphide in ½ oz. injections was applied on both sides of the row, 15 in. apart, 6 in. from the centre of the stools and 8 in. deep. The results indicate that the fumes can penetrate the walls of the pupal cells of *L. albohirtum* and may prove useful for the destruction of these beetles before they are able to emerge from the soil.

MYERS (J. G.) & ATKINSON (E.). **The Relation of Birds to Agriculture in New Zealand. vi. The Hawks and Owls.**—*N.Z. Jl. Agric.*, xxvii, no. 6, pp. 365–374, 2 figs. Wellington, 20th December 1923.

A list is given of the hawks and owls occurring in New Zealand, and though some species may be considered pests in poultry and game rearing districts, they may prove extremely beneficial in other localities, their food consisting almost entirely of insects or vermin.

SEN (P. C.). **Short Notes on Insect Pests and Remedies.**—*Bengal Agric. Jl.*, iii, no. 4, pp. 145–151. Dacca, December 1923.

Short notes are given on a few of the common pests of rice and jute, including the rice hispa [*Hispa armigera*, Ol.], the rice bug [*Leptocorisa varicornis*, F.], the jute hairy caterpillar [*Diacrisia obliqua*, Wlk.], and the jute semilooper [*Anomis sabulifera*, Gn.].

FLETCHER (T. B.). **List of Publications on Indian Entomology, 1922.**—*Agric. Res. Inst., Pusa*, Bull. 147, 42 pp. Calcutta, 1923.

This useful list of publications is arranged under authors, and is annotated as previously [*R.A.E.*, A, xi, 127].

FLETCHER (T. B.). **Report of the Imperial Entomologist, 1922-23.**—*Sci. Repts. Agric. Res. Inst., Pusa, 1922–23*, pp. 61–75. Calcutta, 1923.

Pests especially noticed during the year include *Diacrisia obliqua* on jute (occurring also on swedes, *Dolichos lablab*, radish, sunflower, etc.), which was very troublesome during the rains and was kept in check by hand-picking and removal of alternative food-plants (chiefly weeds) ; *Prodenia litura*, on castor, jute, lucerne and violets ; a Coccid, *Monophlebus contrahens*, on peach, plum and mango in increasing numbers ; *Scirpophaga xanthogastrella* (*auriflua*) in sugar-cane ; *Tetranychus bioculatus* (red spider) on jute, castor and *Hibiscus abelmoschus* ; *Pelamia undata*, on velvet bean [*Stizolobium*] and *Phaseolus radiatus* ; and *Giarua sceptica*, on soy-bean [*Glycine hispida*] and velvet bean.

Among fruit pests the life-history of the Psyllid, *Euphalerus citri*, on *Citrus* was worked out. Indigenous varieties of grape-vine were heavily infested with *Phenacoccus* sp.

With regard to cotton, it has been suggested in Madras that the abnormal shedding of bolls is connected with the presence of Capsid bugs (*Ragmus* spp.) on the plants [*R.A.E.*, A, xi, 217]. This has not been noticed in the present observations, but the occurrence of numbers of nymphs of *Oxycarenus laetus* and *Dysdercus cingulatus* seems to increase the fall of bolls considerably, though this requires further investigation.

The following are some of the more interesting insects sent in during the year :—*Aetherastis circulata*, Meyr., reared from caterpillars on Para rubber [*Hevea brasiliensis*] in South India ; *Mimela passerinii*, Hope, and *Anomala flavipes*, Arrow, eating leaves of cherry ; *Hieroglyphus banian*, F., damaging sugar-cane ; *Hellula undalis*, F., damaging cauliflower seedlings ; *Rabila frontalis*, Wlk., bred from cotton-bolls in Madras ; *Hoplocerambyx spinicornis* and two undescribed Longicorn beetles of the genus *Praonetha* found near Para rubber in Burma ; *Aspidiotus orientalis* and *Chrysomphalus aurantii* on rose-stems ; *Lasioderma testaceum* and *Tribolium* sp. in ground-nut and coconut cake ; *Bruchus affinis* and *B. analis* in dried pulses ; *Sipalus hypocrita*, in all stages, boring dead wood of Para rubber ; *Indarbela theivora* on tea-bushes ; and *Cirphis unipuncta* damaging wheat in Baluchistan.

Much damage was done to lac by the Noctuid, *Eublemma amabilis*, the entire crop being destroyed in some places.

Peluffo (A. T.). **Enemigos del tabaco.** [Tobacco Pests.]—*Uruguay* : *Minist. Indust., Defensa Agric., Bol. Mens.*, iv, no. 11–12, pp. 125–128, 3 figs. Montevideo, November-December 1923.

The most serious pest of tobacco in Uruguay is a Sphingid, *Protoparce sexta*, Joh., var. *paphus*, Cram. The eggs are laid on the leaves of tobacco, and hatch in 3 or 4 days. The larval stage lasts 20–21 days, and when mature a single larva is capable of defoliating a plant of medium size in the course of a day. Pupation takes place 3 or 4 ins. beneath the surface of the ground, and in summer the moth emerges 21–23 days later. In Uruguay two generations occur in a year, the first appearing in December and the second in February. The latter hibernates in the pupal stage, pupating in April and May.

To combat this pest the ground should be ploughed 4 or 5 ins. deep immediately after harvesting, thus destroying or exposing the hibernating pupae. The larvae may be collected or killed by a spray such as lead arsenate or Paris green. The only natural enemy known in Uruguay is a Braconid, *Apanteles* sp., a parasite of the larva.

Monegal (R. M.). **Sobre el** *Pissodes notatus* **enemigo de los pinares.** [Notes on *P. notatus*, a Pest of Pine Woods.]— *Uruguay* : *Minist. Indust., Defensa Agric., Bol. Mens.*, iv, no. 11–12, pp. 150–12. Montevideo, November-December 1923.

Prior to 1917 the scale, *Leucaspis pini*, Htg., was the only pest of pine trees observed in Uruguay. *Pissodes notatus*, F., appeared between 1918 and 1919, and has become a very serious pest [*R.A.E.*, A, x, 227]. Its attacks have been favoured by the pines being planted close together so that they are weakened through lack of air and

sunshine. Thinning out the trees is advised as the best measure against this beetle, and it is suggested that when pines are about five years old, a distance of about 18 ft. should be allowed between them.

Brèthes (J.). **Sección Entomologia.** [Report of the Entomological Department.]—*Inst. Biol., Soc. Rur. Argentina, Memoria Mayo 1922–1923,* pp. 37–44. Buenos Aires, 1923.

In this report for the year ended May 1923 the insects dealt with include the alfalfa caterpillar, *Colias lesbia,* as yet found only on lucerne, *Eriocampoides limacina,* probably introduced prior to the establishment of the plant quarantine service, and a beetle, *Dyscinetus gagates,* attacking wheat. Both the larvae and adults of a Chrysomelid, *Plagiodera erythroptera,* destroy the leaves of willows. A Halticid, *Caeporis stigmula,* feeds on the foliage of Cucurbitaceae. Coccid pests included the pine scale, *Leucaspis pini, Diaspis* (*Aulacaspis*) *pentagona, Aspidiotus perniciosus* and *Pulvinaria* (*Lecanium*) *cestri,* which infests *Cestrum parqui. Cydia pomonella* is a serious pest of apples, pears and other fruits. The orange caterpillar, *Papilio thoas thoantiades* is parasitised by a Chalcid, *Pteromalus caridei,* and *Plutella maculipennis,* which is a pest of cabbages, by *Limnerium leontiniae.* The control of the woolly aphis [*Erisoma lanigerum*] effected by *Aphelinus mali,* introduced from Uruguay, has surpassed all expectation. The employment of *Tetrastichus platensis* and *Parexorista caridei* against the bagworm [*Oeceticus kirbyi* var. *platensis*] has also proved beneficial.

Barreto (B. T.). **El gusano taladrador del tallo y otros insectos daniños a la caña de azúcar. Segunda parte. Los gusanos blancos.** [The Grub Stem Borer and other Insects injurious to Sugar-cane. Second Part. The White Grubs.]—*Agricultura,* i, no. 3, pp. 2–3. Santiago de las Vegas, December 1923.

Dyscinetus picipes, Burm., and *Ligyrus tumulosus,* Burm., are the chief Coleopterous larvae that attack sugar-cane in Cuba. Hatching from eggs deposited at the foot of the cane, the larvae require 5 to 6 months to become fully mature, and during this period they feed on the tender parts or rootlets. The pupal stage lasts about 3 months. The adults feed on the leaves of sugar-cane, orange, etc. Light-traps are an effective means of dealing with them, and the larvae may be exposed to birds or for collection by frequent cultivation of the ground. No natural enemies are known.

Seín, Jr. (F.). **Las abejas en los cafetales.** [Bees in Coffee Plantations.]—*Porto Rico Insular Expt. Sta., Rio Piedras,* Circ. 79, 6 pp., 1 fig. San Juan, P.R., November 1923.

Coffee planters in Porto Rico have suggested that their crops have been decreased since apiaries have been established in large numbers. Experiments made by the author show that bees are not only non-injurious, but actually beneficial as pollinators. They do not cause any loss of flowers.

Seín, Jr. (F.). **El gorgojo del ñame del guineo.** [The Banana Rhizome Weevil.]—*Porto Rico Insular Expt. Sta., Rio Piedras*, Circ. 82, 7 pp., 2 figs. San Juan, P.R., November 1923.

The banana weevil, *Cosmopolites sordidus*, Germ., was observed for the first time in Porto Rico in December 1921, and has since occurred in several localities. A brief account is given of the life-history of this weevil and of the measures against it.

Cockerell (T. D. A.). **Coccidae (Scale-insects and Mealy-bugs) of the Madeira Islands.**—*Nature*, cxiii, no. 2831, pp. 164–165. London, 2nd February 1924.

Of the Coccids collected by the author in Madeira, which were described by E. E. Green [*R.A.E.*, A, xi, 456], only six may be considered endemic, *viz.*, *Phenacoccus latipes*, Green; *Pseudococcus heterospinus*, Green; *P. artemisiae*, Green (with reference to which the author points out that this name is preoccupied by *P. artemisiae*, Essig, 1909); *Aspidiotus maderensis*, Ldgr.; *Targionia laurina*, Ldgr.; and *Cryptophyllaspis bornmuelleri*, Rübs.

The remaining 40 species have no doubt all been introduced, and the list is likely to be augmented with the ever-increasing introduction of foreign plants. In view of local conditions spraying or fumigation is extremely difficult, and there are also obstacles to the establishment of a satisfactory system of plant quarantine. The best method of dealing with these pests would appear to be the importation of natural enemies, some of which are already present, though not in adequate numbers. This problem is being dealt with in co-operation with certain workers in the United States of America.

Uvarov (B. P.). **A Revision of the Old World Cyrtacanthacrini (Orthoptera, Acrididae).—iv. Genera *Austracris* to *Cyrtacanthacris*.**—*Ann. & Mag. Nat. Hist.*, xiii, no. 73, pp. 1–19, 2 figs. London, January 1924.

This is the fourth section of this revision [*R.A.E.*, A, xi, 525]. Among the species of special economic importance, a new genus, *Nomadacris*, is erected for the red locust of South Africa, *N.* (*Cyrtacanthacris*) *septemfasciata*, Serv., and it is suggested that *N. coangustata*, Lucas, may perhaps represent the solitary phase of this species.

Hebard (M.). **Studies in the Dermaptera and Orthoptera of Colombia. Third Paper. Orthopterous Family Acrididae.**—*Trans. Amer. Ent. Soc.*, xlix, pp. 165–313, 8 pls. Philadelphia, Pa., 1923.

In discussing the Colombian species of the genus *Schistocerca*, the author includes *S. urichi*, Arrib., amongst the synonyms of *S. paranensis*, Burm., which is the destructive locust of South America and is often confused with the North American *S. americana*, Drury, and with the Old World *S. gregaria*, Forsk. (*peregrina*, Ol.); the characters distinguishing it from *S. gregaria* are briefly summarised.

Barber (H. S.). **Two New *Conotrachelus* from Tropical Fruits (Coleoptera, Curculionidae).**—*Proc. Ent. Soc. Wash.*, xxv, no. 9, pp. 182–185, 1 fig. Washington, D.C., December 1923.

Conotrachelus aguacatae, sp.n., is described from individuals reared from larvae taken in fallen fruit of the avocado in Mexico, and *C. sapotae*, sp.n., was reared from larvae boring tunnels in the fruit of the

sapodilla (*Achras sapota*) near Havana, Cuba. The latter is recorded as the only insect of economic importance known to attack this fruit in Cuba; this may indicate recent introduction from another island or from the mainland.

GAHAN (A. B.). U.S. Bur. Ent. **Types of two Chalcid-flies misidentified.**—*Proc. Ent. Soc. Wash.*, xxv, no. 9, pp. 185–188. Washington, D.C., December 1923.

The author draws attention to a misidentification in a previous paper [*R.A.E.*, A, xi, 292] and points out that *Encyrtus aphidiphagus*, Ashm., and *E. siphonophorae*, Ashm., are not identical, and therefore *Aphidencyrtus*, Ashm., and *Propachyneuronia*, Gir., are not isogenotypic, the latter genus being instead a synonym of *Pachyneuron*, Wlk. The corrected synonymy is listed.

In another paper [*R.A.E.*, A, ix, 199] *Meraporus calandrae*, How., was listed as a synonym of *Lariophagus distinguendus*, Först. It now appears beyond doubt that *M. calandrae*, How., is identical with *Aplastomorpha vandinei*, Tucker, the former being the older name. The corrected synonymy of *A. calandrae* is given.

MASON (P. W.). U.S. Bur. Ent. **The Raspberry Cane Aphid (Hom.).**—*Proc. Ent. Soc. Wash.*, xxv, no. 9, pp. 188–190. Washington, D.C., December 1923.

Amphorophora sensoriata, sp.n., is described from females taken on *Rubus*; it is found sparingly on the stems of raspberry and never on the leaves, as is *A. rubi*, Kalt., with which it has been confused. There are no records of the species on raspberry during late July, August or early September, so that migration to an alternate food-plant may occur, although probably a few individuals remain on *Rubus* throughout the year. It has a wide distribution in the Eastern United States.

FISHER (W. S.). U.S. Bur. Ent. **A Change of Name in Buprestidae.**—*Proc. Ent. Soc. Wash.*, xxv, no. 9, p. 190. Washington, D.C., December 1923.

The author finds that the name *Trachys cyanipennis* given to a Buprestid described in a previous paper [*R.A.E.*, A, xi, 126] had been previously used by him for a species from the Philippines. He therefore proposes *T. panamaensis*, n.n., for the species from Panama.

RYERSON (K.). **Avocado Culture in California. Part I. History, Culture, Varieties, and Marketing.**—*California Agric. Expt. Sta.*, Bull. 365, pp. 575–629. Berkeley, Cal., June 1923. [Received 11th February 1924.]

The insect pests of avocado in California have not been sufficiently troublesome to necessitate spraying operations. They include *Saissetia oleae* (black scale) and a few cases of infestation by *Polycaon confertus* (olive twig borer) and *Sericata alternata*. *Heliothrips haemorrhoidalis* is sometimes very abundant, but the pest most likely to become serious is *Pseudococcus citri* (citrus mealybug), satisfactory control of which necessitates the elimination of the Argentine ant [*Iridomyrmex humilis*]. Unidentified leaf-miners cause slight damage, especially in nurseries.

Watson (J. R.). **Synopsis and Catalogue of the Thysanoptera of North America.**— *Florida Agric. Expt. Sta.*, Bull. 168, 100 pp. Gainesville, Fla., December 1923.

In the present work 86 genera and over 300 species are enumerated, the object of the paper being to index scattered literature and bring the keys up to date. The keys given are for the most part translations of Karny's key [*R.A.E.*, A, xi, 109], with a few minor changes by the author and the addition of genera described since Karny's work. Only those families that are represented in North America have been dealt with; but some species at present only known from Panama have been included, as it seems likely that they may be found in the West Indies, or even Southern Florida, or are liable to be carried there.

The new genera and species described are: *Erythrothrips durango*, sp.n., on agave flowers in Mexico; *Sedulothrips hubbelli*, sp.n., on rubber trees in Honduras; *Neoeurhynchothrips cubensis*, gen. et sp.n., on *Uriesia* sp. in Cuba; *Liothrips perseae*, sp.n., on avocado in Honduras; and *Hindsiana catchingsi*, sp.n., on lemon in association with *Chrysomphalus aonidum* in Louisiana.

The new genus *Treherniella* is erected for *Haplothrips orlando*, Watson & Osborn.

Cushman (R. A.). U.S. Bur. Ent. **New Genera and Species of Ichneumon-flies.**—*Proc. U.S. Nat. Mus.*, lxiv, art. 4, no. 2494, pp. 1–16, 2 figs. Washington, D.C., 1924.

Besides the two new genera and eleven new species described, notes are given on some previously described species.

Of the new species *Chrysopoctonus bicolor* is recorded from *Chrysopa lateralis*, Guérin, on avocado in Florida; *Cryptoideus bituminosus* from *Sphenophorus pertinax*, Ol., in New York; *C. anthracinus* from *Saperda obliqua*, Say, in Connecticut; *Spilocryptus cimbicivorus* from *Cimbex americana*, Leach, in South Dakota; *Hyposoter rubiginosus* from *Olene basiflavus*, Pack., in Connecticut; and *Xiphosomella stenomae* from *Stenoma catenifer*, Wlsm., in the Panama Canal Zone.

Wagle (P. V.). **Protection of Cabbage and Knolkhol Seedlings from Flea-beetles.**— *Agric. Jl. India*, xix, pt. 1, pp. 45–47. Calcutta, January 1924.

Cabbage and knol-khol seedlings may be protected from flea-beetles by enclosing the beds in which they are grown with a fine meshed curtain, or by catching the beetles on a sticky plate. In these experiments a coarse woven native cloth was fixed over the bed on a bamboo frame about 18 ins. from the ground. The lower edges were kept down by stones. The net may easily be removed for watering, but should be replaced immediately. The diminished light under the net did not appear to have any serious effect on the seedlings after transplanting.

For catching the beetles a rectangular tin plate 24 ins. by 18 was fixed to a handle, the plate being covered with a mixture of 1 part boiled undi oil (*Calophyllum inophyllum*) and 2½ parts powdered resin. Any similar oil would probably have the same results, provided the right proportion of resin were added to keep the mixture adhesive. The plate is held over the infested seed-bed and the plants brushed. The

insects fly up when disturbed and adhere to the plate. By repeating this treatment on 4 or 5 successive days the infestation may be almost entirely controlled. As the mixture dries it may be made sticky again by exposure to the sun.

HOULBERT (C.). **Thysanoures-Dermaptères et Orthoptères de France de et la faune européenne. I.**—16mo, xii + 382 pp., 87 figs., 9 pls. Paris, Octave Doin, 1924.

The first two parts of the volume deal with Thysanura and Dermaptera respectively and include the morphology, anatomy and bionomics of the insects in general. The systematic sections of each part contain keys to the groups, families, genera and species, as well as short descriptions of the latter, for the whole of Europe, including the Caucasus. The third parts deals with Orthoptera in general under the following headings: Morphology, colouration, physiology, locomotion and sense, reproduction, postembryonal development, economic importance and control (a very brief outline of certain out-of-date methods being given), and general classification. A special part on systematics is to follow.

UVAROV (B. P.). **Сельскохозяйственная энтомология.** [Agricultural Entomology.]—**Издание союза студентов агрономов Тифлисского Государственного Университета.** [Publication of the Union of Agronomy Students of the Tiflis State University.]—8vo, 234 pp., 104 figs. Tiflis, 1923.

This handbook on agricultural entomology describes in general the damage caused by insects, and gives a general outline of remedial measures. A list of the pests occurring in Georgia is given, with notes on their life-history and habits and recommendations for their control. These pests are arranged under the crops attacked, including a list of pests of stored products.

BIANKI (W. L.) & KIRITCHENKO (A. N.). **Практическая Энтомология. Руководство к практическим занятиям по Энтомологии (курс высших учебных заведений).** [Practical Entomology. Handbook of Practical Studies in Entomology (Course for advanced Educational Institutions).]—**Государственное Издательство** [Govt. Pubn.], pt. 4, 8vo, lxvii + 320 pp., 48 figs. Petrograd, 1923.

This is a further instalment of a work already noticed [*R.A.E.*, A, ix, 479], the present part being devoted to the general structure of Heteropterous Rhynchota, and containing numerous keys for the determination of the subfamilies, genera and species. The geographical distribution of the species concerned in northern and central Russia and the countries immediately surrounding this region is given in the form of tables.

DUBOIS (P.). **Un Parasite de l'abricotier, la** *Lyda nemoralis*.— *Vie agric. & rur.*, xxix, no. 6, pp. 93–94, 1 fig. Paris, 9th February 1924.

The information in this paper on *Neurotoma* (*Lyda*) *nemoralis* has been noticed from another source [*R.A.E.*, A, xi, 529].

Takahashi (R.). **Life-cycles and Appearance of Winged Forms in Aphidinae.**—*Dobutsugaku Zasshi*, xxxv, pp. 217–225. Tokyo, May 1923.

The appearance of the winged forms in the Aphidinae cannot be explained by external influences. In *Astegopteryx quercicola*, Tak., the first instar nymphs of the winged forms are provided with numerous small wax-pores in groups on the dorsum, as are also the later instars, while the nymphs of the wingless form are furnished with many wax-pores arranged in a single row along the whole margin of the body, but not on the dorsum, throughout all the instars. This might be taken as an indication that whether the Aphid becomes winged or wingless is determined before birth.

In *Macrosiphum formosanum*, Tak., and *Aphis malvoides*, v.d.G., the winged viviparous females produce mostly wingless forms, while the wingless viviparous females produce both wingless and winged ones.

Bagnall (R. S.). **The Genus *Melanothrips*, with Description of a New Species.**—*Ent. Mo. Mag.*, lx, pp. 9–11. London, January 1924.

Keys are given to the subfamilies of the Aeolothripidae, the genera of the Melanothripinae and the species of *Melanothrips*. The British species are *M. fuscus*, Sulzer, found in numbers on cruciferous plants such as *Sinapis*; *M. ficalbii*, Buffa, occurring on grasses; and *M. angusticeps*, sp. n., both sexes of which were found in a yellow flower (? *Potentilla*).

Fox-Wilson (G.). *Thereva plebeia*, **L., larvae attacking Cabbages and Potatoes.**—*Ent. Mo. Mag.*, ix, pp. 16–17. London, January 1924.

Thereva plebeia, L., of which the mature larva is described, injured spring cabbage plants during the months of August, September and October 1921–1923, occurring both alone and in company with larvae of *Euxoa* (*Agrotis*) *segetum*, Schiff., and *Feltia* (*A.*) *exclamationis*, L.

The result of two seasons' experiments show that plants growing in natural soil (Bagshot sand) that was devoid of organic manures, such as leaf mould, green and farmyard manures, were directly attacked by the larvae, which bored their way into the tubers, roots and stems of cabbages and potatoes. The addition of a generous proportion of humus caused the larvae to avoid the growing plants and to feed upon the decaying vegetation. Larvae, three parts grown, were introduced into pots in August and fed intermittently throughout the winter; they pupated in February and emerged as adults in the latter part of April and early in May.

Thompson (W. R.). U.S. Bur. Ent. **Recherches sur les Diptères parasites. Les larves primaires des Tachinidae du groupe des Echinomyiinae.**—*Ann. Epiphyties*, ix, no. 3, pp. 137–201, 12 pls. Paris, 1923.

From this study of the primary larvae of a large number of species of the Echinomyiine group of Tachinids, the author is convinced that the characters of this stage form an accurate basis for specific

identification and definition. Though it is difficult, if not impossible, to separate in the primary larval stage certain species that are easily distinguishable in the adult form, it has been shown in the case of other groups of Tachinids [*R. A.E.*, A, x, 354] that some species, which it is almost impossible to separate in the adult stage, can be readily differentiated in the first larval one. On the basis of primary larval characters, a definite systematic classification can be established. This classification does not always correspond with that derived from the adult characters, but the opinion is expressed that the larval characters show the true affinities between the species of this group better than those of the adults.

FEYTAUD (J.). **Etude sur le Doryphore** (*Leptinotarsa decemlineata*, **Say**) **et les moyens de le détruire. (Observations faites en 1922.)**—*Ann. Epiphyties*, ix, no. 4, pp. 209–306, 1 pl., 9 graphs, 13 figs. Paris, 1923.

A general account is given of the appearance of the Colorado potato beetle (*Leptinotarsa decemlineata*, Say) in France, with notes on the biology of the insect and remedial measures against it [*R. A.E.*, A, xi, 16, 232, etc.].

S[CHENK] (P. J.). **Carbolineum in't gebruik.** [Carbolineum in Use.]—*Floralia*, xlv, nos. 1, 2, 4, 5, 6, pp. 10–11, 25–26, 61–62, 73–74, 88–89, 11 figs. Assen, 4th, 11th, 25th January; 1st & 8th February 1924.

This article deals with the practical use of carbolineum for combating insect and fungus pests. A 6 per cent. solution is sufficient against Aphids attacking plum and apple, but 7 per cent. will check the fungus, *Monilia*, as well. Buyers of fruit trees should purchase only from nurseries where spraying in winter with carbolineum is a regular practice. Carbolineum is effective against *Psylla buxi* in strengths of 5–10 per cent., and it is now recognised that one application of this insecticide is effective against nearly all pests having a stage that hibernates in accessible situations.

BOGDANOV-KATKOV (N. N.). **Опытная работа в области энтомологии в Северо-Западной России.** [Experimental Work in the Field of Entomology in North-Western Russia.]—Separate from **Извест. Управлен. С.Х. Опытн. Дела** [*Bull. Management Agric. Expt. Work*], pt. 2, 7 pp. Petrograd, 1923.

The projects for the various entomological stations and substations in north-west Russia are outlined, one of the most important being the study of insect pests of grass-lands. In this connection several species of *Cephus* and *Harmolita* (*Isosoma*) have been discovered on Graminaceae, their existence not having been previously recorded from these northern regions.

SAKHAROV (N.). **Отчет энтомологического отдела 1916-1923 г.г.** [Report of the Entomological Department for the Years 1916–1923.]—**Труды Саратовск. С.Х. Опытн. Станции** [*Trans. Saratov Agric. Expt. Sta.*], 2 pp. Saratov, 1923.

The more important insect pests in Saratov are *Homoeosoma nebulella* on sunflowers; *Phorbia* (*Adia*) *genitalis* on wheat; various

species of *Biston*, causing injury to forest trees ; *Urellia eluta* infesting *Carthamnus tinctorius* ; *Salebria marmorata* and *Etiella zinckenella* on *Acacia* ; *Plagionotus floralis* and *Bruchophagus gibbus* on lucerne ; and the frit fly (*Oscinella frit*) on winter wheat.

Sakharov (N.). **Причины устойчивости некоторых пшеничных форм по отношению поражаемости их яровой мухой,** *Adia genitalis* **Schnabl. (Diptera, Anthomyidae).** [The Cause of Immunity of some Forms of Wheat in Relation to *Phorbia genitalis*, Schnabl.]—**Энтом. Отдел Сарат. с.х. Опытн. Станции** [*Ent. Dept. Saratov Agric. Expt. Sta.*], no. 1, 19 pp., 2 pls. Separate from **Журнал Опытн. Агрон. Юго-Востока** [*Jl. Expt. Agron. South-East*], ii, no. 1. Saratov, 1923. (With a Summary in German.)

Wheat injury generally attributed to frit fly [*Oscinella frit*, L.] in Saratov has upon further inspection proved to be due to *Phorbia* (*Adia*) *genitalis*, Schnabl. Although these flies may easily be confused in the early larval stages, the species concerned may be determined by the character of the injury caused, which in the case of *P. genitalis* is in the form of a spiral tunnel running down the central leaf.

The harder varieties of wheat are more resistant than soft wheats, being protected by the ligula inside the leaf-sheath. During the summer observations, *P. genitalis* was found to lay its eggs exclusively on the soft wheats. The more vigorous varieties are also better able to outgrow the attack.

Sakharov (N.). **Энтомологический очерк Юго-Востока.** [A Note on Entomology in the South-East.]—**Энтом. Отдел Сарат. с.х. Опытн. Станции** [*Ent. Dept. Saratov Agric. Expt. Sta.*], no. 2, 10 pp., 1 map. Saratov, 1923.

The region of the Volga basin south of Samara presents a very interesting field of entomological study owing to the great variation in the conditions of soil, climate, etc. Injurious insects are particularly abundant, almost every crop being seriously attacked. Instances of large outbreaks of pests that have occurred in the past are reviewed, some of which resulted in the total destruction of both wild and cultivated crops throughout the region. The whole region is divided into five districts. An extensive list of insect pests is given, grouped according to these districts. Though many of these pests extend over the whole region, they are only of importance in the districts under which they are listed, except *Loxostege* (*Eurycreon*) *sticticalis*, L., and *Locusta migratoria*, L., which are widely distributed and are injurious wherever they occur.

John (O.). **Thysanopteren aus West-Sibirien.** [Thysanoptera from West Siberia.]—*Ent. Mitt.*, xiii, no. 1, pp. 7–10. Berlin, 8th February 1924.

Among the 16 species listed are *Thrips solanacearum*, Widh., and *Haplothrips aculeatus*, L., both from ears of wheat, and *Zygothrips crassicornis*, sp. n.

TRINCHIERI (G.). **La Conférence Internationale de Madrid en vue de la lutte contre la "Mouche de l'olive."**—*Inst. Internat. d'Agric.*, 8 pp. Rome, 20th September 1923.

In this report an account is given of the organisation of the Conference held at Madrid to discuss the situation with regard to *Dacus oleae* (olive fly), and the resolutions passed at the Conference are summarised [*R. A. E.*, A, xi, 548].

PARKER (T.). **Arsenic in Fruit?**—*F.B.G. Jl.*, ii, no. 12, p. 193. London, December 1923.

An attempt is made to estimate the possibility of danger in the consumption of fruit after arsenical spraying. If lead arsenate containing 50 per cent. moisture is used, with 15 per cent. arsenic pentoxide (AS_2O_5) at the rate of 4 lb. of paste to 100 gallons of water, this mixture contains 0·06 per cent. of actual AS_2O_5. If two applications only were made, the amount of poison on individual fruits would be very small indeed, especially as the tree and foliage would receive a large share of it.

In actual experiments in Berlin with fruits sprayed with lime and Paris green, with or without an adhesive, examinations were made beginning a few weeks after spraying and ending when the material was ready for consumption. No trace of arsenic could be detected on grapes. The highest concentration of AS_2O_3 (arsenic trioxide) found in 100 parts by weight of fresh material was approximately one four-hundredth part. No arsenic was found one month after spraying, and the tests are considered to show conclusively that the danger to health is insignificant. Lead arsenate is used extensively under glass against the tomato caterpillar [*Polia oleracea*], but is seldom employed after the first fruit has set. General recommendations are that spraying with arsenicals should not be done within 6 weeks of picking the fruit.

RENNIE (J.). **Polyhedral Disease in *Tipula paludosa*, Meigen.**—*Proc. R. Phys. Soc. Edinburgh*, Sess. 1921–22, & 1922–23, xx, pt. 6, pp. 265–267, 1 pl. Edinburgh, 1923.

Polyhedral disease has recently been discovered in *Tipula paludosa*, its occurrence in Diptera being of both scientific and practical interest. In the present note the chief properties of the bodies formed in diseased larvae are enumerated, and the relation of polyhedra to the nucleus in the fat-body cells of *Tipula* is explained.

RENNIE (J.) & HARVEY (E. J.). **Mites on Hive Bees and on Hives.**—*Proc. R. Phys. Soc. Edinburgh*, Sess. 1921–22, & 1922–23, xx, pt. 6, pp. 268–270. Edinburgh, 1923.

A brief account is given of mites, other than *Acarapis* (*Tarsonemus*) *woodi*, Rennie, that are found in association with bees and their hives, and these are grouped under the headings of true internal parasites (*A. woodi*); those living amongst and feeding upon organic materials and found commonly in unclean or diseased hives (*Glyciphagus domesticus*, *Carpoglyphus* sp., and an Oribatid nymph); predacious mites (*Cheyletus* sp., *Gamasus crassipes*, and *Iphis* sp.) probably

valuable as predators on *A. woodi*; *Tarsonemus apis*, Rennie, probably transported casually; and those using the body of the bee for transport in the hypopial stage (*Gamasus* and *Rhizoglyphus echinopus*).

Rennie (J.). **Acarine Disease explained.**—*N. Scotland Coll. Agric.*, Memoir no. 6, 50 pp. Aberdeen, August 1923.

This paper is revised, reprinted and enlarged from one previously noticed [*R. A. E.*, A, x, 446]. The causal agent of Acarine disease—the mite, *Acarapis* (*Tarsonemus*) *woodi*—is very difficult to deal with, and the importance of limiting the spread of the disease by transferring only guaranteed healthy stock, and of managing the hive on such lines as encouraging timely intensive breeding and stocking with only vigorous and long-lived bees, is pointed out. Any colony in which the disease is well established in the autumn should be destroyed. Experiments aiming at solving the problem of control of the disease are still in progress, but in response to many appeals for information regarding provisional treatment certain recommendations are given for the autumn season. These include fumigation with sulphur in a smoker, which may be prepared by simply sprinkling flowers of sulphur on the usual smoking material, and should be done daily for at least a week and again at intervals of a few days until the bees settle for the winter. A slightly more expensive but better method is with sulphur and nitre. Corrugated paper is made up into a roll to fit the smoker. Excess of flowers of sulphur and nitre are added to about ¾ pint of carbon bisulphide and shaken well from time to time to dissolve to saturation. The prepared paper is steeped in this, shaken up to coat with excess of sulphur, removed and allowed to dry. The paper is then ready for use. The fumigation should be carried out as late in the season as possible, when intermingling of bees of different stocks has ceased. The bees may also be dusted with ordinary flour, frame by frame, while they are still working in the autumn, the flour being applied in a fine spray from a suitable syringe. This lessens the risk of infection by hindering the mites from gaining the spiracles.

Walton (C. L.). **Preliminary Report on the Agricultural Zoology of North Wales.**—*Univ. Coll. N. Wales, Dept. Agric.*, 28 pp. Bangor [February 1924].

As the result of three years' work, notes are given on the chief insect pests affecting agriculture and horticulture in the counties of Anglesey, Carnarvon, Denbigh and Flint. The pests of crops and fruit are listed, with their food-plants, the damage they do, their general distribution, and the work carried out (or in progress) in dealing with them.

Jackson (D. J.). **Insect Parasite of the Pea-weevil.**—*Nature*, cxiii, no. 2836, pp. 353–354. London, 8th March 1924.

The Braconid, *Perilitus rutilus*, Nees, is a parasite of *Sitona lineata*, L., and other weevils of this genus in the British Isles. The eggs are laid in the apex of the abdomen of the host, and their development is described. There are at least three larval instars, the final one being

achieved just before the larva leaves the host. It forces its way out through the apex of the weevil's abdomen and immediately looks for a place in which to spin its white silken cocoon. The host dies a few days later, its body being almost devoid of fat tissue and the reproductive organs being greatly affected. These organs are rendered functionless in a female host whether it is parasitised before the ovaries are mature or after oviposition has begun. The eggs already present in the ovarian tubules degenerate. Although several eggs may be deposited in one host, only one will develop beyond the second instar.

S. A. **Big Bud on Black Currants.**—*Gardeners' Chron.*, lxxv, no. 1941, p. 138. London, 8th March 1924.

An apparently effective method for the destruction and eradication of big bud in black currants [caused by *Eriophyes ribis*] is lightly hoeing the ground about the bushes in the spring to a depth of from two to three inches and then covering the soil with straw and firing it, the bushes afterwards being cut down to six inches above the ground.

Thiem (H.) & Dyckerhoff (F.). **Zur Anfälligkeit von Reben gegenüber der Reblaus des Naumburger Seuchengebietes.** [The Susceptibility of Vines to Attack by the Vine Louse of the Naumburg Area of Infestation.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 2, pp. 6–8. Berlin, 1st February 1924.

Börner's investigations on the susceptibility of vines to attack by *Phylloxera* as occurring in Germany [*R.A.E.*, A, ii, 156] have been continued at Naumburg in central Germany. The general conclusions are that infestation becomes more and more marked according to the more favourable condition of the vines; weak or resting plants are not infested or only slightly so. Vines that were not susceptible when planted in pots retained this character when planted in the open. Besides several varieties of vines varying in susceptibility, there are varieties that are immune and remain so despite variations in place of origin or in environment. In Lorraine Börner found that vines that were infested on the foliage were also infested on the roots, but this was not entirely so at Naumburg, the roots of some hybrids of *Vitis rupestris* being less infested than the foliage, or not at all. Freedom from infestation of the leaves is no guide to the behaviour of the roots. Grafted and non-grafted stocks behave in the same way. These results cannot be applied—as regards vines immune from root infestation—to the western and southern vine areas of Germany, because some valuable vines that are immune at Naumburg are not immune in these areas. Varieties that are attacked at Naumburg should certainly not be planted elsewhere. These investigations show the value to viticulture in central Germany of grafting on stocks that are immune from infestation of the roots by *Phylloxera*, as found at Naumburg. If experiments with *Phylloxera* as found at Naumburg are made, the position of the infestation on the stocks tested permits the detection of vines satisfying the biological requirements of the Aphid in all infested areas.

Meyer (R.). **Die Einführung des Blutlausparasiten** *Aphelinus mali* **Hald. in Deutschland.** [The Introduction into Germany of *A. mali*, the Parasite of the Woolly Aphis.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 2, p. 9. Berlin, 1st February 1924.

From infested material obtained from Uruguay, *Aphelinus mali*, Hald., was bred out on 7th September 1923. On 10th October the parasites were clearly established in colonies of woolly aphis [*Eriosoma lanigerum*, Hausm.], and on 27th October they emerged from their dead hosts. Development thus required about a month.

Kotthoff (P.). **Ernteschädigung durch die gelbe Halmfliege** (*Chlorops taeniopus*) **an Sommergerste.** [Crop Injury to Summer Barley by the Yellow Stem Fly, *C. taeniopus*.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 2, p. 9. Berlin, 1st February 1924.

In an examination of summer barley in 1923, 500 ears from healthy stems yielded 514 grammes of grain, whereas only 310 grammes were obtained from 500 ears from stems infested by *Chlorops taeniopus*. The weights of 1,000 grains were 50·6 and 48·25 grammes respectively for healthy and infested material. There was no difference in germination. The reduction in straw production amounted to about 50 per cent.

Gautier (C.). **Braconides (Hym.) parasites des chenilles d'***Argyroploce variegana* **Hb. et de** *Recurvaria nanella* **Hb.**—*Bull. Soc. ent. France*, 1924, no. 19, pp. 252–255. Paris, 1924.

Ascogaster quadridentatus, Wesm., is recorded as parasitic on *Argyroploce variegana*, Hb., in France. The larvae emerge from the host larva just before the latter is full grown. A supplementary description is given of this species and also of *Ascogaster annularis*, Nees, the latter being found in the same locality, though it has not yet been proved whether it is a parasite of *Argyroploce variegana* or of *Recurvaria nanella*, Hb.

Falcoz (L.). **Observations biologiques sur divers Insectes des environs de Vienne en Dauphiné (2e note).**—*Bull. Soc. ent. France*, 1924, no. 20, pp. 261–263. Paris, 1924.

The parasites recorded include the Chalcid, *Tetrastichus epilachnae*, Giard, which emerged at the beginning of July from pupae of *Adalia bipunctata*, L., taken from *Prunus* (*Cerasus*) *mahaleb* infested with *Phorodon humuli*, Schr. (*Myzus mahaleb*, Koch).

Aulló (M.). **Estudio y extinción de la** *Lymantria dispar* **L. "Lagarta peluda" en Villanueva de Córdoba.** [The Study and Eradication of *Porthetria dispar* or "Hairy Caterpillar" at Villanueva de Cordoba.]—*Rev. Fitopatología*, i, no. 4, pp. 93–95. Madrid, 31st December 1923. [Received 21st February 1924.]

Spring treatment against *Porthetria* (*Lymantria*) *dispar*, L., has been described in a preceding paper [*R. A. E.*, A, xi, 577]. On account of the reduced cost and longer time available, autumn and winter applications to the egg-masses of a mixture of 4 parts coal-tar and

1 part petroleum are valuable. With unpruned oaks one man can treat 38 trees a day on about 1 acre. If the oaks are pruned, 70 trees on about 1¾ acres can be dealt with, the number of egg-masses being about one-half that on unpruned trees. The acclimatisation of *Schedius kuvanae*, How., imported from the United States, has succeeded in the insectarium. The Chalcid egg-parasite stated in the preceding paper to be *Anastatus bifasciatus*, Boy., has been found to be *A. disparis*, Ruschka.

Díaz (B.). **Parásitos de** *Tortrix viridana* **L.** *Macrocentrus thoracicus* **Nees.**—*Rev. Fitopatología*, i, no. 4, pp. 97–99, 1 fig. Madrid, 31st December 1923. [Received 21st February 1924.]

The parasites most commonly obtained from *Tortrix viridana*, L., in the Forest Fauna Laboratory at Madrid are the Ichneumonid, *Pimpla maculator*, F., from the pupa, and the Braconid, *Macrocentrus thoracicus*, Nees, from the larva. The latter has not been recorded before from this moth. It emerges when the caterpillar is due to pupate and spins a cocoon, the adult appearing a fortnight later. *M. thoracicus* was obtained also from *Tortrix* (*Cacoecia*) sp. infesting elm. In turn it is parasitised by *P. maculator* and a Chalcid, *Eutelus mediterraneus*, Mayr. Possibly these parasites may have been attacking the Tortricid caterpillar and reached a Braconid larva within the latter.

Mercet (R. G.). **Un parásito de** *Tortrix viridana* **y una especie nueva de** *Eutelus*. [A Parasite of *T. viridana* and a new Species of *Eutelus*.]—*Rev. Fitopatología*, i, no. 4, pp. 100–107, 4 figs. Madrid, 31st December 1923. [Received 21st February 1924.]

Notes on the distribution, biology and morphology of *Eutelus mediterraneus*, Mayr, are given from the literature. This Chalcid has been obtained in Spain from *Tortrix viridana* on *Quercus ilex*; *Hyponomeuta padellus* on *Prunus*; and from the Cecidomyiid, *Dryomyia lichtensteini*, on oaks.

Eutelus maculipennis, sp. n., is described from males taken near Madrid on olive.

Díaz (B.). **Un bracónido parásito de insecto perfecto.** [A Braconid parasitising an Adult Insect.]—*Rev. Fitopatología*, i, no. 4, pp. 108–110, 2 figs. Madrid, 31st December 1923. [Received 21st February 1924.]

The author has bred a Braconid, *Pygostolus falcatus*, Nees, from an adult Curculionid, *Polydrosus pilosulus*, Chevr., which in company with *P. nanus*, Db., is common on oaks in Badajoz.

Bolívar y Pieltain (C.). **Estudios sobre Calcídidos de la familia Eupélmidos. III. Los** *Anastatus* **de España.** [Studies on Chalcids of the Family Eupelmidae. III. The Spanish Species of *Anastatus*.]—*Rev. Fitopatología*, i, no. 4, pp. 114–122, 1 pl. Madrid, 31st December 1923. [Received 21st February 1924.]

Keys are given to the males and females of *Anastatus bifasciatus*, Boy., and *A. disparis*, Ruschka, the two species of this genus found

in Spain. The former has been obtained there from eggs of *Dendrolimus pini*, L., the latter from those of *Porthetria* (*Lymantria*) *dispar*, L., and it may perhaps also develop in the eggs of *Dicranura vinula*, L. Both these Eupelmids are described and their synonymy given. Most of the references to *A. bifasciatus* really apply to *A. disparis*.

Perrier de la Bathie (H.). **La Culture du Cotonnier à Madagascar.** —*Rev. Bot. app. & Agric. colon.*, iv, no. 29, pp. 19–24. Paris, 31st January 1924.

In quoting from a report by Duchène, the pests of cotton recorded as occurring in Madagascar are *Oxycarenus*, *Dysdercus flavescens* and *Earias insulana*. In view of the abundance of these insects cotton-growing experiments undertaken in 1909–1910 proved a failure. If, however, the cultivation of cotton were extended and the necessary measures for the control of insect pests were undertaken, the industry should prove a profitable one.

Fulmek (L.). **Nog eens het bespuiten van zaadbedden.** [A further Note on Spraying Tobacco Seed-beds.]—*Deli Proefstation*, Vlugschr. 23, 3 pp. Medan, January 1924.

Complaints of scorching of tobacco seedlings and of ineffective action against caterpillar pests in the use of lead arsenate sprays [*R. A. E.*, A, xi, 40, 439] are due to an incorrect composition of the solution and its incorrect application. The spray should contain 1 per cent. of lead arsenate and 0·3 per cent. of soap or 1 per cent. Bordeaux mixture. The spray nozzle should be held about 1½ft. from the plants. About 3½ oz. of fluid should be used per square foot, and only dry plants should be sprayed.

Goco (A.). **Insecticides for Locust Extermination.**—*Philippine Agric. Rev.*, xvi, no. 1, pp. 49-54, 6 pls. Manila, 1923.

During experiments in the Philippines for the control of locusts, poison bran baits were given up in favour of spraying with a 1 per cent. solution of lead arsenate. In localities where spraying was inconvenient good results were obtained with dusting. Applications should be made at the time when the hoppers are about to settle for the night. For dusting, white arsenic is quicker in action and cheaper than lead arsenate, but should only be used when a dusting machine is available, as it is dangerous for the operator to handle, and only on wild plants, as it causes serious foliage injury. Both white arsenic and lead arsenate kill the newly emerged adult locusts.

Spraying with emulsion of fish-oil soap and petroleum only stupefied the locusts for a short time, but it was evident that if the breathing organs were closed by the petroleum, recovery would be impossible. The addition of resin had this effect, but it was not readily soluble in soap solution and the mixture rapidly coagulated when mixed with water. After a number of trials it was found that 1 part of caustic soda (sodium hydrate) (about 80 per cent.) in 12 parts of water would dissolve 6 parts of resin. To this 6 parts of petroleum were added to make a stock solution. Before application the solution was diluted with 8 times its volume of water. Under experimental conditions this mixture proved effective against the adults but only from 20 to 40 per cent. were killed under field conditions.

As a result of further experiments with varying proportions of the mixture the one containing a stock solution of 1 part caustic soda, 2 parts resin and 5 parts petroleum in 5 parts water is recommended for use diluted with 7 times its volume, or the following formula :— resin 1·9, caustic soda 0·95, petroleum 4·7 per cent. When the stock solution was diluted with 10 times its volume of water all locusts were destroyed, but the action of this mixture was slower ; the original mixture was also found to be effective when thoroughly applied, and it is less injurious to the hands of the operator.

The use of this emulsion is recommended against all stages in place of the old, laborious method of driving the insects into pits. When the locusts in cultivated areas have been exterminated, preparations should be made to meet the invading winged individuals from uncultivated ones. Where possible, breeding-places should be located by means of aeroplanes and dusted with white arsenic and calcium arsenate, as these are more effective than lead arsenate. Where dusting is done by aeroplane, seeds of quick-growing forest trees might be scattered at the same time.

While this article was in print, it was discovered that an excess of caustic soda renders the solution less effective. The resin does not always coagulate when part of the caustic soda reacts with the oil on the body of the locust, but only when there is just enough soda to dissolve it ; under these circumstances it coagulates at once.

When the locusts are winged and there is an excess of soda, there is a loss of effectiveness. The wings and the tendons that articulate them, however, are corroded. If there is an excess of soda the solution must be thicker than when there is no excess to kill the hoppers.

Un hémiptère nuisible au riz en Annam.—*Bull. écon. Indochine*, xxvi, Renseignements, pp. 436–437. Hanoi-Haiphong, 25th December 1923.

A Pentatomid of the genus *Podops*, resembling *P. obscura* occurring in China, has been known in the rice fields of Annam for about 4 years, and in 1923 was responsible for the loss of 40 to 50 per cent. of the rice crop in the infested zone. Apparently no variety of rice is resistant to it, and no preference is shown for any particular variety ; infestations are, however, very local and, according to the natives, are most severe in flooded fields. A moist environment seems to be essential for development, and in the warm period of the day the insect descends to the base of the plant, close to the root. It occurs all the year round, either in the rice swamps or in the banks surrounding them, descending to the swamp when the plants begin to show. The nodes are attacked for preference, the sap being sucked out from the stem so that no head is formed. Oviposition occurs either at the base of the rice plants or on the banks, 25 to 40 eggs being laid in one mass. The bugs are said to be able to fly easily from one swamp to another. The most effective remedy is to destroy the bugs after the crop is gathered, by removing all grass from the banks and burning it, and spraying the bank with a powerful insecticide, although this has the disadvantage of depriving cattle of the pasturage that they frequently find on the banks, as well as being a costly and lengthy operation. Poultry will not eat the bugs.

Marshall (G. A. K.). **On new Curculionidae from India (Coleoptera).** —*Ann. & Mag. Nat. Hist.*, 9th Ser., xiii, no. 75, pp. 282–296. London, March 1924.

The new species described include *Cyrtepistomus pini* and *C. glebosus* feeding on the needles of chir pine (*Pinus longifolia*) in the United Provinces.

Bryant (G. E.). **New Species of Phytophaga.**—*Ann. & Mag. Nat. Hist.*, 9th Ser., xiii, no. 75, pp. 299–304. London, March 1924.

The new species described include *Nodonota theobromae* feeding on the leaves of cacao in Brazil.

Jarvis (E.). **Work of the Division of Entomology.**—*23rd Ann. Rept. Queensland Bur. Sugar Expt. Sta.*, pp. 47–51. Brisbane, 1923.

This information on the work of the Bureau of Sugar Experiment Stations in Queensland for the year ending October 1923 has already been noticed from the author's monthly reports.

Kinghorn (J. R.). **The Value of Birds to Man, especially in Relation to Agriculture.**—*Agric. Gaz. N.S.W.*, xxxv, pt. 1, pp. 45–48. Sydney, 1st January 1924.

The value of birds as destroyers of insects is pointed out, and the need for their protection and encouragement is urged. The useful and useless birds that occur in Australia are briefly reviewed.

Gurney (W. B.). **Insect Pests of the Present Season.**—*Agric. Gaz. N.S.W.*, xxxv, pt. 1, pp. 69–71. Sydney, 1st January 1924.

In view of the abundance of grasshoppers in certain districts during 1923 recommendations are made for their control. Systematic spraying with 1 lb. sodium arsenite, 4 lb. treacle and 16 gals. water should be carried out immediately the young hoppers emerge. In preparing the spray it is important that the sodium arsenite and treacle should be dissolved separately in hot water and only mixed after they have been allowed to cool. The spray should be applied to a strip of grass about 30 feet wide around each swarm as well as directly on to the hoppers, 28 lb. of sodium arsenite and 1 cwt. of treacle being sufficient to treat an infested area of 6 acres.

The Rutherglen bug [*Nysius vinitor*, Bergr.] is one of the worst native insect pests in New South Wales ; it multiplies in large numbers in grass and weeds and will attack potatoes, tomatos and almost any succulent vegetable. Even fruit trees may be attacked, spoiling the market value of the crop or causing it to fall. Where the insect appears in serious numbers, it may be necessary to spray with kerosene emulsion or nicotine sulphate or a mixture of both. The bugs may be beaten off the plants into a dish of water and kerosene drawn between the rows.

In the case of heavy infestations on fruit trees daily spraying may be necessary. Good results have been obtained by dusting the trunk and main branches with lime after spraying or dislodging the insects by shaking. The lime prevents the insects from crawling up the trunk. The most essential method, however, is clean cultivation throughout the latter part of the winter and in the spring. By this means a large number are killed in the early stages and the others deprived of food.

Gowdey (C. C.). **The White Flies (Aleurodidae) of Jamaica.**—*Jamaica Dept. Agric.*, Ent. Bull. no. 3, 6 pp. Kingston, 1923.

Notes are given on the Aleurodids occurring in Jamaica, including *Aleurodicus cocois*, Curt., found on coconut, guava and sea-grape (*Cocoloba uvifera*); *A. jamaicensis*, Ckll., on an unidentified food-plant; *Aleurocanthus woglumi*, Ashby, on *Citrus*, coffee, mango, guava, avocado, breadfruit [*Artocarpus incisa*], grape, etc.; *A. spiniferus*, Quaint., on roses and *Citrus*; *Aleuroplatus validus*, Quaint., on an unidentified food-plant; *Aleurothrixus floccosus*, Mask., on lignumvitae (*Guiacum*), guava, *Citrus*, sea-grape and *Plumeria*; and *A. howardi*, Quaint., on *Citrus*, guava, sea-grape and *Plumeria*.

A key is given to the subfamilies of the Aleurodids.

Smyth (E. G.). **A Trip to Mexico for Parasites of the Mexican Bean Beetle.**—*Jl. Wash. Acad. Sci.*, xiii, no. 12, pp. 259–260. Washington, D.C., 19th June 1923.

No parasite was found in Mexico of either the egg or the adult of the bean beetle [*Epilachna corrupta*, Muls.]. The only parasite met with was a Tachinid [*Paradexodes epilachnae*, Aldr., *R. A. E.*, A, xi, 344], which attacks the larvae. Nearly 2,000 living puparia of this fly, or *Epilachna* larvae parasitised by it, have been introduced into the United States, and it is believed that if it were successfully colonised, it would spread rapidly and do much towards control of the beetle. Few predacious enemies were found, the only common one being a Pentatomid, of the genus *Stiretrus*, which was not sufficiently abundant to be of value.

Only two of the large numbers of leguminous plants and trees examined were found to harbour the beetle. These were a wild climbing bean, *Phaseolus* sp., and beggar-weed, *Meibomia* sp. The latter is believed to be the native wild food-plant of *E. corrupta*.

Bridwell (J. C.). **The Occurrence of the Clover Seed Chalcid in the Seeds of** *Astragalus*.—*Jl. Wash. Acad. Sci.*, xiii, no. 12, p. 260. Washington, D.C., 19th June 1923.

Bruchophagus funebris, How., previously found in pods of *Trifolium*, *Medicago* and *Oxytropis lamberti*, is reported in those of *Astragalus douglasi* from California, accompanied by *Bruchus* (*Acanthoscelides*) *pullus*, Fall.

Snodgrass (R. E.). **The Anatomy and Metamorphosis of the Apple Maggot** (*Rhagoletis pomonella* **Walsh**).—*Jl. Wash. Acad. Sci.*, xiii, no. 12, pp. 260–261. Washington, D.C., 19th June 1923.

The evolution of certain details of the anatomy of the larva and pupa of *Rhagoletis pomonella* is discussed.

The larva moults inside the puparium, casting a fourth skin, which remains as an unbroken envelope about the pupa until the fly emerges. The fly leaves both the pupal skin and the fourth larval skin, inside the puparium.

The pupa obtains air through the larval tracheae attached to the anterior larval spiracles of the puparium, these being ruptured inside the fourth larval skin.

Bridwell (J. C.). **The Habits of** *Bruchus bixae.*—*Jl. Wash. Acad. Sci.*, xiii, no. 12, pp. 261–262. Washington, D.C., 19th June 1923.

Large numbers of the capsules and seeds of *Bixa orellana* (from which the annatto dye of commerce is derived) from Panama were found to be infested with *Bruchus bixae*. The adult makes its way in between the partly opened valves of the pod and deposits its eggs singly upon the seeds, each seed providing food for one larva. The beetle may be expected to continue breeding indefinitely in the seeds as long as they are kept at a sufficiently high temperature, but little injury is done to the seeds as far as the colouring matter is concerned, though seeds intended for planting are likely to be destroyed. The maceration of the seed in boiling water in extracting the colour would probably destroy the insects.

Bridwell (J. C.). **Retarded Development in** *Eurytoma rhois.*—*Jl. Wash. Acad. Sci.*, xiii, no. 12, p. 262. Washington, D.C., 19th June 1923.

Numbers of a Chalcid, believed to be *Eurytoma rhois*, were found in the seeds of *Rhus glabra* and *R. typhina* during the winter of 1921–22 near Washington. Few adults emerged, but on examination of the seeds in February 1923 it was found that a large number of the larvae had transformed and died without emerging, probably owing to the excessive heat and dryness of the laboratory. There were also in the seeds many living, full-fed larvae. It is probable that most of the seed-infesting Chalcids possess this ability of remaining dormant as full-fed larvae for extended periods under adverse conditions of drought or temperature, and this must be taken into consideration in their control.

Bridwell (J. C.). **Pupae of the Walnut Hull Maggot living Two Years (*Rhagoletis suavis*, Loew).**—*Jl. Wash. Acad. Sci.*, xiii, no. 12, pp. 262–263. Washington, D.C., 19th June 1923.

During the autumn of 1920 some larvae of *Rhagoletis suavis* were obtained in Maryland, from the pupae of which some adults emerged on 8th March 1921. From that time until 21st June emergence continued sporadically. Others were left untouched until the latter part of the winter, 1921–22, when several puparia were found to contain living pupae. Some of these remained alive until the latter part of the summer of 1922, but they were all dead by the middle of November, thus having remained alive as pupae for nearly two years.

Hargitt (C. W.). **The Digestive System of the Periodical Cicada. II. Physiology of the Adult Insects. III. Morphology of the System in the Nymph.**—*Biol. Bull. Marine Biol. Lab., Woods' Hole, Mass.*, xlv, no. 4, pp. 200–221. Lancaster, Pa., October 1923.

After careful experiments both in the field and in insectaries the conclusion is reached that *Tibicen septemdecim* seldom, if ever, feeds in the adult stage.

Banana Borer Order, 1923.—*Jl. Jamaica Agric. Soc.*, xxvii, no. 11–12, p. 1022. Kingston, November–December 1923.

As a protection against the banana borer weevil [*Cosmopolites sordidus*] no banana or plantain plant may be left neglected and

uncultivated. All such plants must be cut into pieces not more than three-quarters of an inch thick and scattered over the soil in such a way that no two pieces touch.

Osborn (H.) & Drake (C. J.). **An Ecological Study of the Hemiptera of the Cranberry Lake Region, New York.**—*N. Y. State Coll. Forestry*, Tech. Pubn. no. 16, pp. 5–24, 12 figs. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

The contents of this paper on Rhynchota are indicated by its title. The ecological grouping is based on the primitive forest conditions, with particular recognition of the modifications caused by lumbering and by subsequent burning.

Drake (C. J.). **Heteroptera in the Vicinity of Cranberry Lake.**—*N. Y. State Coll. Forestry*, Tech. Pubn. no. 16, pp. 54–86, 1 pl., 15 figs. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

This is an annotated list of the Heteropterous Rhynchota of the Cranberry Lake region, including two new species.

Osborn (H.). **Homoptera in the Vicinity of Cranberry Lake.**—*N. Y. State Coll. Forestry*, Tech. Pubn. no. 16, pp. 24–54, 1 pl., 9 figs. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

Notes are given on the Homopterous Rhynchota of the above district, comprising species belonging to 7 families.

Osborn (H.). **Life History Notes on Cranberry Lake Homoptera.**—*N. Y. State Coll. Forestry*, Tech. Pubn. no. 16, pp. 87–104, 1 pl., 8 figs. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

These notes include life-history studies on *Carynota stupida*, Wlk. (birch tree-hopper), *Telamona barbata*, Van Duz., on aspen, *Idiocerus suturalis*, Fitch (willow leaf-hopper), *I. lachrimalis*, Fitch (aspen leaf-hopper), *Empoasca coccinea*, Fitch (scarlet leaf-hopper of pine), *Thamnotettix kennicotti*, Uhler, on maple, *Elidiptera slossoni*, Van Duz., feeding on decaying tissue of spruce, *Chermes pinicorticis*, Fitch (pine chermes), and *Psylla* (*Psyllia*) *trimaculata*, Crawf., of which *P. astigmata*, Crawf., is a synonym, on fire cherry (*Prunus pennsylvanica*).

Drake (C. J.). **Contribution toward the Life History of** *Galeatus peckhami*, **Ashmead.**—*N. Y. State Coll. Forestry*, Tech. Pubn. no. 16, pp. 105–110, 1 pl. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

The Tingid, *Galeatus peckhami*, Ashm., was found in 1920 in great numbers breeding upon *Aster macrophyllus* and *Eupatorium* sp. in New York State. The eggs are inserted, generally singly, almost entirely within the stem of the plant, near the surface of the ground. There is only one generation in a year, eggs laid during the late summer hatching in the following spring. The nymphal instars and adult are described. Several species of predators were found on the same food-plants.

DRAKE (C. J.). **The Life History of the Birch Tingitid,** *Corythuca pallipes,* **Parshley.**—*N. Y. State Coll. Forestry,* Tech. Pubn. no. 16, pp. 111–116, 1 pl. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

Corythuca pallipes, Parsh., of which *C. cyrta,* Parsh., and *C. betulae,* Drake, are synonyms, shows a preference for yellow birch (*Betula lutea*), being found also on white birch (*B. alba*), beech (*Fagus grandifolia*) and ironwood or hop hornbeam (*Ostrya virginiana*). Mountain ash (*Pyrus americana*) and various maples are also liable to attack, and this bug has been found feeding, if not breeding, on the introduced willow, *Salix sieboldiana.* It probably occurs throughout the northern United States and Southern Canada, and is the most serious pest of yellow birch in the vicinity of Cranberry Lake, especially of the younger trees and seedlings, the foliage of which may be entirely destroyed. There are two generations annually in the Adirondacks, the second hibernating as adults among fallen leaves on the ground. The eggs are deposited on the lower surface of the leaves, and hatch after about 10 days, the nymphs feeding on the lower surface of the leaves, at first in colonies but gradually scattering. The nymphal stages occupy from about 26 to 51 days. The predators, *Anthocoris borealis* and the larvae of *Chrysopa* sp., feed upon both nymphs and adults. A mite, *Trombidium* sp., occasionally attacks the adults.

BLACKMAN (M. W.). **New Species of Ipidae from Maine.**—*N. Y. State Coll. Forestry,* Tech. Pubn. no. 16, pp. 117–136, 4 pls. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

New Scolytids described from Maine are *Xylechinus americanus* in *Pinus strobus* (white pine), *Picea canadensis* (white spruce) and *P. rubens* (red spruce); *Pityophthorus balsameus* in *Abies balsamea*; *P. patchi* in *Abies balsamea, Pinus strobus,* and *Picea canadensis*; *P. biovalis* in *Picea rubens* and *Pinus strobus*; *P. briscoei* in *Picea rubens*; *P. shepardi* in *Picea canadensis*; *P. dentifrons* in *Picea rubens*; and *Cryphalus mainensis* in *Picea rubens* and *Picea canadensis.*

BLACKMAN (M. W.). **Two New Bark-beetles from Colorado.**—*N. Y. State Coll. Forestry,* Tech. Pubn. no. 16, pp. 137–141, 1 pl. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

Descriptions are given of *Ips guildi,* sp. n., and *Pityophthorus murrayanae,* sp. n., both from lodgepole pine (*Pinus murrayana*), in Colorado.

BLACKMAN (M. W.). **Description of** *Hylocurus parkinsoniae* **n. sp., with Revisional Notes on** *Hylocurus* **Eichh., and** *Micracis* **Lec.**—*N. Y. State Coll. Forestry,* Tech. Pubn. no. 16, pp. 142–148, 1 pl. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

Hylocurus parkinsoniae, sp. n., is described from dead *Parkinsonia* in Arizona, and certain species are transferred to this genus from *Micracis.*

MUNDINGER (F. G.). **The Life History of two Species of Nabidae (Hemip. Heterop.),** *Nabis roseipennis*, **Reut., and** *Nabis rufusculus*, **Reut.**—*N. Y. State Coll. Forestry*, Tech. Pubn. no. 16, pp. 149–167, 8 pls. Syracuse, N.Y., December 1922. [Received 11th February 1924.]

The economic importance of the NABIDAE is not fully known, but they feed on many species of insects found on grasses and are therefore beneficial, although some slight damage may be done to plants by their oviposition punctures. The life-history of *Nabis roseipennis*, Reut., and *Nabis rufusculus*, Reut., is described. Only one generation seems to occur in the summer, and the females probably hibernate through the winter and oviposit in the spring. Climate is probably the greatest check to the numbers of these insects, severe cold or sudden changes killing many of the younger nymphs. Both species are widely distributed in North America, occurring from British Columbia to Colorado and New Brunswick to Virginia. Certain Reduviids and Phymatids as well as other insects are predacious on them, and cannibalism occurs in all stages. A Trombidiid mite and a Tachinid, *Leucostuma atra*, have been observed parasitising *N. roseipennis*.

COPELLO (A.). **Biología de** *Mallophora ruficauda* **(Wied.).**—*Physis*, vi, no. 21, pp. 30–42, 2 pls. Buenos Aires, 30th November 1922. [Received 11th February 1924.]

The larva of the Asilid fly, *Mallophora ruficauda*, Wied., preys upon the larvae of *Phileurus vervex*, Burm., which are extraordinarily abundant in cultivated areas in Argentina, and other Melolonthids are also attacked. As the adult flies are predacious on honey bees to a serious degree, a knowledge of its biology is important, and it is suggested that any measures to check it should be directed against the eggs. These are laid in batches in summer, from December to February, on fences, etc.

LIZER (C.). **Tres cóccidos nuevos para la Fauna argentina.** [Three Coccids new to Argentina.]—*Physis*, vi, no. 21, pp. 99–100. Buenos Aires, 30th November 1922. [Received 11th February 1924.]

Three Coccids that are thought to be new to the Argentine fauna are *Orthezia insignis*, Dougl., on *Gardenia* sp. growing in the open, whereas this scale has been recorded elsewhere from greenhouses; *Asterolecanium variolosum*, Ratz., on *Quercus sessiflora*; and *Eulecanium* (*Lecanium*) *persicae*, F., on grape vines, peaches and *Maclura aurantiaca*.

LIZER (C.). **Notas sobre tres especies del género** *Dactylopius* **(Coccidae) halladas en el pais.** [Notes on three Species of *Dactylopius* found in Argentina.]—*Physis*, vi, no. 21, pp. 106–111, 3 figs. Buenos Aires, 30th November 1922. [Received 11th February 1924.]

The three species dealt with are *Dactylopius tomentosus*, Lam., on *Opuntia sulphurea* and *Cereus aethiops*, *D. confusus*, Ckll., on *O. wetmorei*, and *D. indicus*, Green; and their synonymy is discussed.

Blanchard (E. E.). **Apuntes sobre** *Zophodia analamprella* **Dyar y otros Lepidópteros que viven sobre Cactáceas en la Argentina.** [Notes on *Z. analamprella* and other Lepidoptera living on Cactaceae.]—*Physis*, vi, no. 21, pp. 119–123. Buenos Aires, 30th November 1922. [Received 11th February 1924.]

This paper contains observations made in 1920–21 by the author and Dr. W. B. Alexander, when the latter was seeking insect enemies of cactus in Argentina. Of the 149 species found on Cactaceae, Lepidoptera proved of the chief importance, their larvae having an appreciable effect in checking these plants. Seven species were taken, of which six have been described by Dyar as new.

Zophodia analamprella, Dyar, is both coccidophagous and phytophagous in its larval stage. It feeds on the scales, *Dactylopius indicus*, Green, *D. confusus*, Ckll., and *D. tomentosus*, Lam., and on their food-plants, *Opuntia sulphurea*, *O. bonaerensis*, *O. quilimo*, *O. utkilio* and *O. russelli*. If the scales are absent, the fruits and shoots of these plants are eaten. Owing to the cannibal habits of the larvae, it is seldom that more than one is found in a fruit. They are also destroyed in numbers by a Braconid, *Apanteles alexanderi*, Brths. Pupation takes place in a silken cocoon among the débris at the foot of the plant. The adults are strongly attracted by artificial light. *Z. analamprella* is an important pest of the cochineal industry in north-eastern Argentina. *Z. stigmapherella*, Dyar, mines the shoots of *Cereus validus*. *Cactoblastis cactorum*, Berg, attacks various species of *Opuntia*. *C. bucyrus*, Dyar, is capable of development in *Opuntia*, but is met with on *Echinopsis* and *Pilocereus*. These two species of *Cactoblastis* are the most important pests of native Cactaceae. The adults of *C. bucyrus* appear in February and March. The larvae devour the interior of the shoots, and pupate in a cocoon on the ground. There are probably two generations a year. *Oxamia hemilutella*, Dyar, oviposits on the flowers of *Cereus validus*, and the larvae feed on the ovaries of the developing fruit. Eggs, larvae and adults were found in February. *Mimorista pulchellalis*, Dyar, occurs in the larval stage within the shoots of *Echimopsis* sp. and completes its development there, the adult appearing in March. *Cereophagus futilalis*, Dyar, was found in February on *C. validus*, but its relation to that plant is uncertain.

Blanchard (E. E.). **Apuntes sobre dos dípteros argentinos.** [Notes on two Argentine Diptera.]—*Physis*, vi, no. 22, pp. 319–323, 3 figs. Buenos Aires, 30th April 1923. [Received 11th February 1924.]

One of the flies dealt with is an Agromyzid, *Leucopis bellula*, Willist., found feeding on the eggs and larvae of a Coccid, *Erium* sp., infesting a cactus, *Cereus aethiops*. It may prove of value against *Pseudococcus*.

Bruch (C.). **Observaciones biológicas acerca de** *Salpingogaster nigriventris* **Bigot (Díptero-sírfido).** [Biological Observations on *S. nigriventris*.]—*Physis*, vii, no. 23, pp. 1–6, 2 figs., 1 pl. Buenos Aires, 21st September 1923. [Received 11th February 1924.]

The Syrphid, *Salpingogaster nigriventris*, Big., is very useful as a destroyer of the scale, *Lecanium perinflatum*, Ckll., attacking *Cestrum*

parqui and other Solanaceae in Argentina. It is presumed that the eggs are laid near the Coccids. The Syrphid larvae reach maturity in about 3 weeks. They pupate on the leaves or stalks of *C. parqui* or near by, and transform into the adult in about a fortnight. The various stages are described in detail.

BLANCHARD (E. E.). **Aphid Notes. Parts III and IV. Argentine Species of the Subtribes Pentalonina and Aphidina.**—*Physis*, vi, no. 21, pp. 43–58, 6 figs.; vii, no. 23, pp. 24–45, 10 figs. Buenos Aires, 30th November 1922 and 21st September 1923. [Received 11th February 1924.]

The first two papers of this series were published together [*R. A.E.*, A, x, 606]. In part iii keys are given to the genera of the subtribes PENTALONINA and APHIDINA and to the Argentine species of the genus *Anuraphis*.

The species dealt with are:—PENTALONINA: *Picturaphis vignaphilus*, gen. et sp. n., from *Vigna luteola*; and *Idiopterus nephrolepidis*, Davis, which at times is a serious pest of wild and cultivated ferns, but is usually kept in check by Syrphids and Hymenopterous parasites. APHIDINA: *Anuraphis helichrysi*, Kalt., from *Senecio*, *Aster*, *Prunus* and Compositae; *A. iridis*, Del Guer., from *Iris florentina*; *A. persicae*, Sulz., from plum, cherry and peach, of which last it is the chief Aphid enemy, causing much injury in the spring to the young leaves; *A. persicae-niger*, Smith, on peach foliage and rootlets; *A. tragopogonis*, Kalt., on *Tragopogon*; and *A. xanthii*, Del Guer., on *Xanthium* sp.

In part iv the section on the subtribe APHIDINA is continued. A key to the Argentine species of *Aphis* is given, and the following species are dealt with: *Aphis africana*, Theo., from *Avena sativa*; *A. bazzii*, sp. n., from *Euonymus* spp.; *A. camellicola*, Del Guer.; *A. eryngii*, sp. n., from *Eryngium paniculatum*; *A. gossypii*, Glov., from *Gossypium*, *Cucumis*, *Vitis*, *Citrus* (*A. affinis* var. *gardeniae*, Del Guer., probably being an aberrant form of this species); *A. illinoisensis*, Shimer, of which *A. ampelophila*, Del Guer., is a synonym; *A. insularis*, sp. n., from *Senecio bandriensis*; *A. maidis*, Fitch, from *Saccharum officinarum*; *A. nerii*, Boy., from *Nerium oleander* and *Araujia sericifera*; *A. sambuci*, L., from *Sambucus australis*; and *A. solanophilus*, sp. n., from *Solanum* spp.

BLANCHARD (E. E.). **A new Aphidian Tribe from Argentina.**—*Physis*, vii, no. 24, pp. 120–125, 2 figs. Buenos Aires, 12th December 1923.

Lizerius ocoteae, gen. et. sp. n., is described from apterous and alate parthenogenetic females, alate males and apterous sexual females, taken on the tender terminal stems and leaves of *Ocotea acutiflora* at Buenos Aires. A new tribe, LIZERINI, is erected for this genus.

MOLINARI (E.). **Sobre un enemigo natural del género** *Eucalyptus*. [A Natural Enemy of *Eucalyptus*.]—*Physis*, vii, no. 24, p. 135. Buenos Aires, 12th December 1923.

Attention is drawn to a Cerambycid beetle, *Phoracantha semipunctata*, that develops within the trunks of *Eucalyptus* spp., especially *E. globulus*, and threatens the destruction of these trees in parks, etc.

Bondar (G.). **Os insectos damninhos. xxxi. O gafanhoto (locustideo) do cacaoeiro,** *Meroncidius intermedius,* **Brunner.** [Injurious Insects. xxxi. The Tettigoniid attacking Cacao, *M. intermedius.*]—*Chacaras e Quintaes,* xxix, no. 1, pp. 27–28, 3 figs. S. Paulo, 15th January 1924.

The larvae and adults of *Meroncidius intermedius,* Brunner, feed on the bark of the branches and probably also on the foliage of cacao in Brazil. This is of slight importance, but the female causes serious injury by sawing a series of parallel groves on the trunk or branches in order to oviposit in them. The bark falls at this spot leaving a cankerous wound about 2–3 inches long, that may result in the death of the part of the tree above it. The best method for combating this Tettigoniid consists in protecting insectivorous birds, lizards and bats.

16th Annual Report of the Commissioner of Agriculture of the State of Texas.—pp. 19–32. Austin, Tex., 1st November 1923. [Received 12th February 1924.]

In his report of the division of orchard and nursery inspection G. J. Scholl gives a list of the more important insect pests found during the year ended 31st August 1923 in nurseries and greenhouses. To prevent the dissemination of citrus white fly [*Dialeurodes citri,* Ashm.] growers are required to spray Cape jasmin [*Gardenia jasminoides*] with an oil emulsion before a certificate is granted. The camphor scale [*Pseudaonidia duplex,* Ckll.] has been discovered in certain localities on camphor trees of an old abandoned Japanese nursery, but very little damage has been done by this pest so far.

The cottony cushion scale [*Icerya purchasi,* Mask.] reappeared in certain sections, but was almost immediately controlled by the liberation of the Coccinellid [*Novius cardinalis,* Muls.].

The work in connection with the division of edible nuts is reported on by J. H. Burkett. One of the most important insect pests of pecan nuts is the nut case-bearer [*Acrobasis caryaevorella,* Rag.], which in Texas is not amenable to the same remedial measures as recommended for the eastern States [*cf. R. A. E.,* A, ix, 350].

Recent experiments against the obscure scale [*Chrysomphalus obscurus,* Comst.] on pecan are reported on by J. S. Woodard. Seven different sprays were tried, of which some were fairly effective, whilst others injured and even killed the trees. The most satisfactory results were obtained with 1 gal. fish-oil soap dissolved in 1 gal. boiling water, to which is then added 1 gal. red engine oil, the whole being thoroughly mixed. To this is added ¼ pint lye mixed with 7 gals. water, the spray being applied while hot.

McDonald (R. E.). **Report of the Entomologist.**—*16th Ann. Rept. Commiss. Agric. State Texas,* pp. 33–38. Austin, Tex., 1st November 1923. [Received 12th February 1924.]

The pink bollworm [*Platyedra gossypiella,* Saund.] has apparently not infested any fresh area in Texas since 1921, indicating the success of the eradication programme in the eastern part of the State, though the moth still exists in the western zones. In 1922 the non-cotton zones were changed to regulated zones so that in 1923 there were no non-cotton zones in effect. In 1922 upwards of 38 million pounds of cotton seed was disinfected, the two general types of machine in use being one

in which live steam is turned directly on the seed and the other in which the seed comes in contact with heated pipes. The germination percentage of the disinfected seed was slightly higher than that of the controls.

In view of the large number of machines that have recently been put on the market for catching boll weevils [*Anthonomus grandis*, Boh.] tests were organised for a comparison of their efficiency. In many instances however the infestation was so slight that no determination could be made; the results of 20 different methods are briefly summarised.

Experiments with calcium arsenate dusting, the Florida method [*R. A. E.*, A, xi, 73] and poisoned molasses were carried out, but as the infestation on all plots was always lower than 10 per cent., the results of these tests are not absolutely reliable.

SHOEMAKER (J. S.). **Lime Sulphur Injury.**—*Sci. Agric.*, iv, no. 6, pp. 180–184. Ottawa, Ont., February 1924.

It is not definitely known how lime-sulphur causes injury when sprayed on plants. Experience in the past indicates that some factors conducive to, and correlated with, the destruction of the chlorophyll by lime-sulphur solution are conditions leading to a thin epidermis, reduction of pubescence, loose internal structures, presence of nascent oxygen, strong sunlight liberating actinic rays and heat, and subsequent killing and oxidation of the tissues. The literature dealing with these various theories is reviewed. Though lime-sulphur injury is external, the effect is internal, resulting from a disturbance of the balance of material within the cells and intercellular spaces. Various factors responsible for injury may at times act independently, together or supplementally to each other, but at present no one factor can be said to be responsible under all conditions.

Such injury should, however, be regarded as a minor matter, and the benefits derived from timely and thorough spraying or dusting should always be emphasised in orchard work.

BELYEA (H. C.). **The Control of White Pine Weevil** (*Pissodes strobi*) **by mixed Planting.**—*Jl. Forestry*, xxi (1923), no. 4, pp. 384–390, 1 fig. (Abstract in *Expt. Sta. Record*, xlix, no. 8, p. 761. Washington, D.C., December 1923.)

Studies undertaken near Fulton, New York, show that the planting of pure plantations of white pine [*Pinus strobus*] in central and western New York constitutes a severe hazard to this tree in regard to the liability to attack by the white pine weevil (*Pissodes strobi*), there having been 73.4 per cent. infestation. It is concluded that the planting of mixed plantations with white pine where Scotch pine [*Pinus sylvestris*] is the introduced species does not greatly lessen the liability to infestation of the plantation as a whole (only about 10 per cent.). Scotch pine, while not so susceptible as white pine, is liable to infestation by *P. strobi* even when planted in pure stands, in which infestation may affect between 20 and 25 per cent. of the trees; but this susceptibility is less than one-third of that of white pine planted pure. This susceptibility will, however, be increased considerably by mixed planting with white pine. The use of Scotch pine with white pine in mixed planting under the conditions described in this article has

reduced the amount of infestation in white pine by almost 40 per cent. While Scotch pine in mixed plantations is just about as susceptible to weevil infestation as the white pine, the fuller use of this method is more than justified in the basis of the lessened infestation in the white pine over that in pure plantations of the species. The Scotch pine here acts as a trap tree. It is believed that mixed planting offers a method of control of *P. strobi*. While it does not offer absolute protection to the white pine, it does result in relative protection and reduces materially both the severity and duration of the infestation.

Alfaro (A.). **Langosta migratoria.** [The Migratory Locust.]—*Bol. Camara Agric. Costa Rica*, ii, no. 1, pp. 33–41, 1 fig. San José, February 1922. [Received 20th February 1924.]

This is a brief account of locust invasions in Costa Rica, which—owing to its situation in the Central American isthmus—serves as a corridor for the migrating swarms. Owing to the abundance of vegetation, locusts are not so destructive in America as in Africa, where desert spaces are common, and such crops as coffee and tobacco thus remain untouched. *Schistocerca paranensis* was the species concerned in 1915, and it is not indigenous. A poison-bait that has been used successfully in Costa Rica contains 1 part by weight of powdered white arsenic, $\frac{1}{4}$ part of caustic soda, and 50 parts of water. The solution is boiled for 10 minutes and sweetened.

Snapp (O. I.) & Alden (C. H.). **Dusting and Spraying Peach Trees after Harvest for Control of the Plum Curculio.**—*U.S. Dept. Agric.*, Dept. Bull. 1205, 18 pp., 2 pls., 4 figs. Washington, D.C., 25th January 1924.

During 1919–22, dusting experiments have been made after harvest in commercial peach orchards in Georgia and Mississippi, with a view to destroying adults of *Conotrachelus nenuphar*, Hbst. (plum curculio) in late summer or early autumn when, for lack of fruit, the beetles are forced to feed on the foliage before hibernating. It was found that two applications of a dust containing 10 per cent. lead arsenate and 90 per cent. hydrated lime could be used with safety, and in one plot this reduced the number of beetles by 6 per cent., while on the untreated plot in the same period there was an increase of nearly 70 per cent. The dust is not effective after two weeks; the first application should be made 4 weeks after harvesting the latest variety of peaches, and the second 2 weeks later, using about $\frac{1}{5}$ lb. per tree. Liquid sprays used after the harvest, when the usual liquid spray schedule had been followed earlier in the season, resulted in severe scorching of the foliage.

Weiss (H. B.) & Lott (R. B.). **Notes on** *Corythucha marmorata* **Uhler in New Jersey (Hemip. : Tingitidae).**—*Ent. News*, xxxv, no. 2, p. 68. Philadelphia, Pa., February 1924.

During July *Corythucha marmorata*, Uhler, was found in large numbers causing injury to wild asters. All stages were found on the plants. The eggs were laid in irregular elongate masses in the tissue of the underside of the leaves near the ribs. Some leaves contained as many as 150 eggs. The larvae fed in colonies on the lower leaf-surfaces.

MARCOVITCH (S.). **The Strawberry Crown Borer in Tennessee.**— *Tennessee Agric. Exp't. Sta.*, Bull. 128, pp. 23–53, 8 figs. Knoxville, Tenn., November 1923.

Tyloderma fragariae, Riley (strawberry crown borer) has become very abundant in strawberry-growing regions in the southern United States [*R.A.E.*, A, x, 451]. The strawberry is the only cultivated plant known to be infested, but under experimental conditions oviposition occurred on Indian strawberry (*Duchesnia indica*) and on *Potentilla pumila*, and adults were bred from these plants. The adults also fed on blackberry, both in the field and in rearing cages. An average of 95 eggs per female are laid, the egg stage varying from 7 to 29 days, according to temperature. The larval stage varies in length from 24 to 54 days, and the pupal stage from 6 to 17 days. The life-cycle is generally believed to occupy a year. Several females were observed to live through the winter, after ovipositing in the preceding summer, and continued to oviposit in the following spring. Besides the remedies previously suggested [*loc. cit.*], old infested or abandoned patches should be ploughed in late autumn or early summer, when the beetles are dormant, and immediately harrowed. Subsequent rains will make the soil compact and difficult for emergence, for the beetles are unable to emerge when buried from 3 to 6 inches deep in moist or compacted soil, though loose, dry soil offers little resistance to them. Every precaution should be taken to secure plants from uninfested plots, and at digging time it is advisable to free the plants as much as possible from soil, as overwintering beetles may adhere to it.

DIETZ (H. F.) & SNYDER (T. E.). U.S. Bur. Ent. **Biological Notes on the Termites of the Canal Zone and the adjoining parts of the Republic of Panama.**— *Jl. Agric. Res.*, xxvi, no. 7, pp. 279–302, 8 pls. Washington, D.C., 17th November 1923.

Notes are given on the economic importance and swarming habits of the 21 species of termites found in the Panama Canal Zone.

BROOKS (F. E.). U.S. Bur. Ent. **Oak Sapling Borer,** *Goes tessellatus*, **Haldeman.**— *Jl. Agric. Res.*, xxvi, no. 7, pp. 313–317, 3 pls. Washington, D.C., 17th November 1923.

Larvae of the Cerambycid, *Hammoderus* (*Goes*) *tessellatus*, Hald., have for the past 10 years been very injurious to young oak and chestnut trees in central West Virginia, wide irregular burrows being made in the wood at the base of the trunk. Trees from ½ to 2 in. in diameter suffer most. About 25 per cent. of the infested trees die, either as a direct result of the larval injury or owing to breaking a few inches above the ground at the exit holes made by the emerging beetles. The insects have a tendency to be gregarious, so that infestation may be very much localised in different areas of the same plantation. The adults, after remaining in the pupal chamber in the wood for 5 to 7 days, escape through a circular hole gnawed through the bark; this hole is from 7 to 9 mm. in diameter and frequently causes the breaking of the smaller trees. Emergence of the adults occurs in late May and early June, and oviposition begins within a week or 10 days. The eggs are laid singly in a circular cavity 6 to 12 mm. in diameter gnawed by the female, and the incubation period is apparently about 3 weeks.

The larva, immediately upon hatching, begins to feed in the bark and to eject sawdust-like castings through small openings eaten to the outside. The larval period occupies 3, and probably sometimes 4 or 5, years ; in the first season the larvae burrow in the outer wood, both above and below the oviposition puncture, working downwards as the cold weather approaches and wintering near the ground level. In the second season they bore deeper into the wood, working in and around the heart, and the burrow is eventually enlarged, some 4 or 5 inches above ground level, at the upper end, to form a pupal chamber. Pupation generally begins in April and has been observed to last about 40 days.

By far the greatest injury is done to saplings of white oak (*Quercus alba*), though adults have also been reared from chestnut oak (*Q. prinus*). Young chestnuts (*Castania dentata*) are less frequently attacked, and occasionally other trees. No insect enemies of *H. tessellatus* have been found, but woodpeckers destroy numbers of larvae in their burrows. Wherever fresh castings are being thrown out, the borers can easily be located and killed by inserting a short piece of wire into the burrow.

BRINLEY (F. J.). U.S. Bur. Ent. **Preparation and Properties of Colloidal Arsenate of Lead.**—*Jl. Agric. Res.*, xxvi, no. 8, pp. 373–374. Washington, D.C., 24th November 1923.

In the course of control work on *Popillia japonica*, Newm. (Japanese beetle), commercial lead arsenate was found to have a decidedly repellent effect on the insect. Experiments were then undertaken to determine whether this was due to the physical properties of the arsenate or to some other factor. The preparation of colloidal lead arsenate was studied and is explained. It was found that a colloidal lead arsenate could be obtained by precipitating lead arsenate in the presence of a protective colloid, such as gelatin, by the chemical action between lead nitrate and disodium arsenate. The colloidal arsenate is composed of very fine particles that will remain in suspension for several days. When sprayed upon a leaf, the material forms a thin, smooth film over the entire surface, which is not easily washed off by rain.

TAKAHASHI (R.). **On the Nymphs of the Aphidinae.**—*Proc. Ent. Soc. Washington*, xxvi, no. 1, pp. 1–11, 3 figs. Washington, D.C., January 1924.

This summary of the results of the author's studies on the nymphs of the APHIDINAE deals with ecdysis, morphology and some differences between the winged and wingless forms. A table is also given of the antennal joints in the different stages of the species examined.

CHITTENDEN (F. H.). U.S. Bur. Ent. **Evidence that the Mexican Bean Beetle was present in the United States as early as 1850.**—*Proc. Ent. Soc. Washington*, xxvi, no. 1, p. 19. Washington, D.C., January 1924.

The author draws attention to the fact that *Epilachna corrupta*, Muls., occurred in the United States as early as 1850.

HORSFALL (J. L.). **The Effects of Feeding Punctures of Aphids on certain Plant Tissues.**—*Pennsylvania Agric. Expt. Sta.*, Bull. 182, 22 pp., 7 pls. State College, Pa., November 1923. [Received 25th February 1924.]

As pointed out by the author, these studies and conclusions are practically identical with those recorded by Davidson [*R.A.E.*, A, xi, 250]. The Aphids used in the present investigations were *Aphis rumicis*, L., on *Tropaeolum minus*, *Rumex crispus*, *Chenopodium album*, and *Amarantus retroflexus*; *Myzus persicae*, Sulz., on *Freesia refracta* and *Digitalis purpurea*; *Macrosiphum rudbeckiae*, Fitch, on *Solidago* sp.; and *M. ambrosiae*, Thomas, on *Bidens* sp.

None of these species produced galls on the tissues of any of the above mentioned plants or on their other food-plants. Hypertrophy or hyperplesia, if present, is not evident in the gross appearance of the plant organs.

KUNKEL (L. O.). **Insect Transmission of Aster Yellows.**—*Phytopathology*, xiv, no. 1, p. 54. Lancaster, Pa., January 1924.

During the time of most rapid spread of the aster yellows disease in experimental plots at Yonkers, N.Y., the tarnished plant bug, *Lygus pratensis*, L., and the leaf-hoppers, *Cicadula sexnotata*, Fall., and *Empoasca unicolor*, Gill., were present in abundance. A third leaf-hopper, *Graphocephala coccinea*, Först., was rather rare. Aphids were occasionally observed, but were never abundant. Experiments in which *L. pratensis*, *E. unicolor* and *G. coccinea* were transferred from diseased plants to healthy young plants in insect-proof cages gave, in all cases, negative results. Similar experiments in which *C. sexnotata* was used showed that this leaf-hopper readily transmits aster yellows, but is capable of doing so only after feeding on diseased plants. It is believed that *C. sexnotata* is responsible for most, if not all, of the spread of aster yellows in the vicinity of New York City.

WILCOX (R. B.) & SMITH (F. F.). **Transfer of Mosaic Disease from Red to Black Raspberries.**—*Phytopathology*, xiv, no. 1, p. 55. Lancaster, Pa., January 1924.

By placing *Macrosiphum* (*Amphorophora*) *rubi*, Kalt., from healthy raspberry plants upon leaves of red raspberries affected with mosaic disease, allowing them to feed for a few days, and then transferring them to young tip leaves of healthy black raspberries the disease was produced in the latter. Black raspberry plants on which were placed Aphids of the same species from healthy raspberries remained apparently healthy. The symptoms were not induced by Aphids of other species.

CARSNER (E.) & STAHL (C. F.). **The Relation of *Chenopodium murale* to Curly-top of the Sugar Beet.**—*Phytopathology*, xiv, no. 1, p. 57. Lancaster, Pa., January 1924.

Many of the beet leaf-hoppers [*Eutettix tenella*] that come into beet fields in spring are not infective. Inoculations have shown that *Chenopodium murale*, a winter food-plant of the hopper, is very resistant to curly-top. Tests with nymphs reared on this plant from infective parents show that the virus of curly-top is usually so

attenuated by its passage through this resistant plant that it subsequently fails to cause the disease, or else produces only mild cases. It seems probable that the non-infective leaf-hoppers that enter the beet fields in spring come from *C. murale* or plants comparable with it in relation to curly-top. Studies are in progress to determine whether the attenuated virus can be reactivated.

GODFREY (G. H.). **Present Status of Stem and Bulb Nematode in America.**—*Phytopathology*, xiv, no. 1, p. 62. Lancaster, Pa., January 1924.

The stem and bulb infesting Nematode, *Tylenchus dipsaci*, is increasing in importance in North America. In the susceptible crops that are adapted to rotations, such as clover, bulbs and strawberries, reasonable control can usually be secured without economic loss. In the case of lucerne, however, with which rotations are not so practicable, the disease is capable of becoming more serious.

These Nematodes have been grouped according to food preference into so-called biological strains. Under favourable conditions, such as those existing in a cool, humid locality, certain strains have shown their ability to extend to other food-plants. Potato, onion, pea, buckwheat [*Fagopyrum esculentum*], turnip and other crops may be infested by Nematodes from one or more of the primary hosts. The possibility of gradual adaptation to new hosts is indicated. Nematode-infested dandelions (*Taraxacum officinale*) were found in western New York, in Ontario, and at Boston. Their wide spread has been explained, in part at least, by the finding of Nematodes actually within the seeds. They may thus be carried by the wind and established in a new locality.

MCLAINE (L. S.). **New Regulations under the Destructive Insect and Pest Act.**—*Agric. Gaz. Canada*, xi, no. 1, pp. 20–23. Ottawa, January-February 1924.

This is a summary of the regulations in force under the Destructive Insect and Pest Act. A general revision of these regulations has been made, taking effect from 1st September 1923. All plants for ornamental purposes or propagation, except seeds, are now classified as nursery stock, and permits are necessary to import such shipments. The foreign regulations also restrict the importation of plants from the Hawaiian Islands on account of the Mediterranean fruit-fly [*Ceratitis capitata*], the importation of nursery stock, forest and quarry products from the New England States on account of the gipsy moth [*Porthetria dispar*] and brown-tail moth [*Nygmia phaeorrhoea*], and the importation of maize, cut flowers and other plants from the European corn borer [*Pyrausta nubilalis*] areas in the United States. A total prohibition has been placed on the importation of lucerne hay from districts infested with the alfalfa weevil [*Hypera variabilis*], and plants with soil from Asia, on account of the Japanese beetle [*Popillia japonica*] and other soil-infesting insects.

BAILEY (I. W.). **Some Relations between Ants and Fungi.**—*Ecology*, i, no. 3, pp. 174–189, 3 pls. Lancaster, Pa., July 1920.

That ants play an important part in the dissemination of disease has been already suggested by various writers. Although ants are

supposed to take up fluid or semifluid substances, they have a curious infrabuccal chamber into which pass spores, fragments of mycelia and bits of decaying plant tissue. In this chamber the fungi become mixed with food residues and mineral and vegetable detritus, forming a pellet, which is subsequently voided upon any convenient surface. The composition of this pellet suggests that it is a "culture" or potential source of infection. It has been demonstrated that the hyphae and spores in the voided pellets of Attine queens are actually viable and give rise to luxuriant growths of hyphae. In view of these facts, it seems probable that ants are active agents in the dissemination of many of the higher fungi.

Cook (W. C.). **The Distribution of the Pale Western Cutworm, *Porosagrotis orthogonia*, Morr. : a Study in Physical Ecology.**— *Ecology*, v, no. 1, pp. 60–69. Brooklyn, N.Y., January 1924.

This paper is a continuation of an earlier study [*R. A. E.*, A, xii, 49]. The following is the author's summary :—An attempt is made to evolve by statistical methods a curve and climograph showing the total effect of climate upon the life-history of the pale western cutworm, *Porosagrotis orthogonia*, Morr. By combining the monthly figures for temperature and precipitation in the areas of greatest abundance during the generation preceding the June in which damage was reported, and weighting them with the reported percentage of total seeded area destroyed, mean figures were obtained for each month of the preceding year, from which the climograph was plotted and the curve calculated.

Assuming this curve to represent the optimum conditions for the species, the climographs for normal conditions at practically all of the Great Plains and Great Basin stations were compared therewith, and divided into groups according to the closeness of their resemblance to the optimum curve. These groups were then charted on a map, and lines drawn to indicate climatic conditions very favourable to this species, less favourable, and absolutely unfavourable. If the assumption is correct, this map should show the final range of the species, outside of which it will probably never be found in destructive numbers.

Coad (B. R.), Johnson (E.) & McNeil (G. L.). **Dusting Cotton from Airplanes.**— *U.S. Dept. Agric.*, Dept. Bull. 1204, 40 pp., 19 figs. Washington, D.C., January 1924.

The method of releasing insecticide dust from aeroplanes [*R. A. E.* A, x, 277 ; xi, 411] has been adapted in tests against *Alabama argillacea*, Hb. (cotton leafworm) and, to a certain extent, against *Anthonomus grandis*, Boh. (cotton boll weevil). The tests described have not by any means determined the practicability of using this means of applying insecticides, but they have shown that dust can be blown on to plants from the air and can be made to adhere to the plants under daytime conditions. *Alabama argillacea* was successfully controlled with much less poison than is necessary with ordinary dusting machines, and though a more thorough application would be necessary to control *Anthonomus grandis*, the indications are that the aeroplane might be used with advantage against this insect also. Financially, the method would seem to be more economical than the use of ground machines, and would of course be employed by communities in co-operation.

THOMAS (F. L.). **Life History and Control of the Mexican Bean Beetle.** — *Alabama Polytech. Inst. Agric. Expt. Sta.*, Bull. 221, 99 pp., 21 figs. Auburn, Ala., January 1924.

A detailed account is given of *Epilachna corrupta*, Muls. (Mexican bean beetle) as occurring in Alabama [*cf. R. A.E.*, A, ix, 374 ; x, 121, 436, 611 ; xi, 262, etc.]. Experiments with many insecticides on different varieties of beans are described, and the best methods of dusting are explained. The formula recommended as being the most successful consists of $16\frac{2}{3}$ per cent. high grade calcium arsenate, $16\frac{2}{3}$ per cent. fine dusting sulphur and $66\frac{2}{3}$ per cent. hydrated lime. Green beans dusted with this mixture may be safely used as food, but washing is advised. The dust should be applied on dry, windless days, four or five applications usually being sufficient for protecting early-planted varieties of snap or string beans, the first application being given soon after beetles appear. Bush varieties should be treated once weekly, and for pole beans five applications, beginning the first week in May, are advocated. Cowpeas may be similarly treated.

Beans should be stimulated by fertilisation and cultivation to good foliage growth, and if nearly destroyed by heavy infestation, they should be ploughed under to a depth of 2 in. to kill the insects. Hand-picking is only economical in small gardens. Pole beans should be planted in rows at least 4 ft. apart to allow for dusting when the beans are grown. Occasional search should be made during the winter and early spring among accumulations of leaves and rubbish for hibernating adults, and fence rows and ditch banks should be cleaned up and the rubbish burned.

HOWARD (L. O.). **Report [1922–23] of the Entomologist.** — *U.S. Dept. Agric.*, 37 pp. Washington, D.C., 1923.

This report forms a review of the outstanding entomological features of the year ended 30th June 1923, much of the information having been previously noticed.

Scouting to determine the limits of infestation of the Japanese beetle [*Popillia japonica*] reveals a constant natural spread of the beetle, which cannot be prevented. As compared with 270 sq. miles infested in the previous year, 770 sq. miles are now involved. Very late ploughing in autumn and late spring ploughing tend to reduce the numbers of grubs. Several shipments of parasites from Japan, Korea and Hawaii have been received and liberated ; these include the Tachinids, *Ochromeigenia ormioides* from Yokohama and *Centeter cinerea* from Sapporo, as well as others mentioned in the last report [*R.A.E.*, A, xi, 260]. A species of *Tiphia* is promising, as it occurs in spring and thus supplements an autumn species from northern Japan. Parasites are also being sought in China and India, and the possibility of utilising native parasites is being investigated ; at present a very small percentage seems to be destroyed by these. The value of fungous and bacterial diseases, particularly those attacking the larval stage, is being studied, including a species of *Isaria* from France. A fair number of beetles were killed by spraying the foliage with lead arsenate at a strength of 4 lb. to 50 U.S. gals. of water with 2 lb. flour or casein spreader. One or two applications were sufficient to

protect the foliage during the season of beetle occurrence. For soil treatment around nursery stock, lead arsenate thoroughly worked in has given rather satisfactory results, but further study is necessary before recommendations can be made. In grass lands, such as golf greens and fairways, the grubs can be destroyed by the use of carbon bisulphide emulsion.

The predominating grape leaf-hopper in Ohio seems to be *Erythroneura tricincta* var. *cymbium*, for which dusting tests are being made. A large proportion of the adults seems to remain in the vineyards through the winter and to congregate on various plants, such as dandelions, before the grape foliage appears in the spring. Many of these can be destroyed by spraying. The grape-berry moth [*Polychrosis viteana*] is still an important pest in some vineyards; where previous spraying has been thorough, a single application about 10th July is generally effective against it. Against grape *Phylloxera*, paradichlorobenzene, which seemed promising, has not given good results. The grape mealybug [*Pseudococcus bakeri*] is now being largely controlled by parasites. The pecan-nut case-bearer [*Acrobasis nebulella*] is best checked by lead arsenate sprays timed with reference to hatching of the eggs. Both this species and the green stink-bug [*Nezara viridula*] (which can be much reduced by substituting velvet beans for cowpeas in the orchard) continue to be serious pests of pecans in the south-eastern States. Spraying during early spring when the larvae of *A. nebulella* are tunnelling the young shoots has not proved successful, but after the nuts have set, much better results can be obtained with about 3 applications. The pecan-leaf case-bearer [? *A. hebescella*] can be checked by lead arsenate sprays in August and early September, and dusting is also being tried. Studies are being made of war gases with regard to their suitability for insect control. A report is given of the year's work in connection with the gipsy moth [*Porthetria dispar*] and the brown-tail moth [*Nygmia phaeorrhoea*]. In the infested territory the area defoliated has been much less than in previous years. The alfalfa weevil [*Hypera variabilis*] is spreading to an alarming extent and now infests practically all the lucerne regions of Utah and Idaho, as well as large areas in certain other States. A lead arsenate spray applied once during the season is generally an effective check, except in south-west Idaho, where two sprayings are necessary, because the oviposition period is longer. Parasites are being introduced from France against this pest. An account is given of the distribution and damage done by various species of grasshoppers. The southern corn stalk borer [*Diatraea lineolata*] has become so increasingly abundant and destructive in some regions of Texas and New Mexico that in certain areas the growing of maize has been practically discontinued. Although apparently of tropical origin, this moth has been found as high as 5,000 ft., and as it is a potential menace to the whole maize-growing region, a close study of it is being made. It is believed that the migrations of the rice weevil, *Calandra* (*Sitophilus*) *oryzae*, from storage centres are responsible for much, if not all, of the widespread infestation found in the field at harvest time.

Nicotine dust has been proved to be ineffective for the control of the citrus thrips [*Scirtothrips citri*]. The indications are that spray materials in general use, when properly applied, will be satisfactory against the thrips, but special attention is being directed to the

development of economical and effective measures to be used simultaneously against this and the citricola scale [*Coccus citricola*]. The papaya fruit-fly [*Toxotrypana curvicauda*] is difficult to control on account of its habit of boring into the fruit. By the use of cloth and paper bags at the proper time much of the injury can be avoided. Against *Chrysomphalus aonidum* in greenhouses, it has been found that fumigation with 1 oz. sodium cyanide per 1,000 cu. ft. of space will give complete control without injury to its food-plants (*Kentia*, *Phoenix*, sago palm and rubber), provided that they are properly shaded before and after fumigation. Lubricating oil emulsion is also effective, killing 78 per cent. with one application and approximately 100 per cent. with two. The Mexican bean beetle [*Epilachna corrupta*] has extended into Mississippi and Virginia. The remedies that gave the best results during 1922 were 1 lb. magnesium arsenate in 50 U.S. gals. water, and dusts composed of 1 lb. magnesium arsenate to 4 or 5 lb. air-slaked lime ; 1 lb. tricalcium arsenate to 9 lb. air-slaked lime ; and 1 lb. calcium arsenate, 1 lb. dusting sulphur and 4 parts hydrated lime. The Tachinid, *Paradexodes epilachnae*, has been introduced from Mexico as a control, and additional parasites are being sought for in Guatemala and Mexico. Against *Dicyphus separatus* (tomato suckfly) in Texas, from 3 to 5 applications of nicotine sulphate dust are required. The Australian tomato weevil [*Listroderes nociva*], recently discovered in southern Mississippi, is found to be more widely distributed over the Gulf Coast region than was anticipated, and is a severe pest of turnips and tomatos in some localities. *Diabrotica balteata* (belted cucumber beetle) has become an important pest of beans, cucurbits and other vegetables. *Aphis* (*Rhopalosiphum*) *pseudobrassicae* (turnip aphis) is effectively checked by nicotine dust. *Haltica litigata* (strawberry flea-beetle) has recently become a serious pest in Louisiana.

The situation with regard to cotton pests is discussed. One of the important discoveries of the year is the fact that there is a distinct chemical relation between the composition of the dew on the cotton plant and the action of certain insecticides. The dew is strongly alkaline, and this discovery opens up many important possibilities while explaining some apparent inconsistencies in the results of certain chemicals previously studied. Wireworms in Kentucky were reduced 50 to 60 per cent. by the use of bait flavoured with nitrobenzene ; this poison was also effective against webworms in grassland. The Tachinid parasite, *Lixophaga* (*Euzenilliopsis*) *diatraeae*, introduced from Cuba against the sugar-cane moth borer [*Diatraea saccharalis*] seems merely to survive without multiplying to any extent. Immersion of the sugar-cane stalks in water at 122° F. for 20 minutes before planting killed all borers and did not hinder germination of the autumn-planted cane, but killed many eyes in the spring-planted cane. Another sugar-cane borer, *Diatraea canella*, was observed for the first time in Mexico. A Tachinid parasite, *Phorostoma* sp., was found in Mexico in tunnels of sugar-cane borers.

The knowledge of forest insects, and particularly pine bark-beetles, gained during the past years, is now being put to practical use, and many forest projects are outlined. In addition to the better-known pine insects, the pandora moth [*Coloradia pandora*] has been causing considerable injury to pines in Oregon, the larch sawfly [*Lygaeonematus erichsoni*] has appeared in threatening numbers in Michigan, and pine needle miners are increasing in parts of Oregon.

Haywood (J. K.). **Report [1922–23] of the Insecticide and Fungicide Board.**— *U.S. Dept. Agric.*, 6 pp. Washington, D.C., 1923.

This report describes the working during 1922–23 of the Insecticide and Fungicide Board, which aids in the enforcement of the Insecticide Act of 1910, designed to prevent the sale of insecticides or fungicides below standard quality, or improperly labelled.

Marlatt (C. L.). **Report [1922–23] of the Federal Horticultural Board.**— *U.S. Dept. Agric.*, 36 pp. Washington, D.C., 1923.

The administration of the plant quarantine act for the year ended 30th June 1923 is recorded, as dealing with the following insects :— Pink bollworm [*Platyedra gossypiella*, Saund.], European corn borer [*Pyrausta nubilalis*, Hb.], Japanese beetle [*Popillia japonica*, Newm.], gipsy moth [*Porthetria dispar*, L.], brown-tail moth [*Nygmia phaeorrhoea*, Don.], date scale [*Parlatoria blanchardi*, Targ.] and camphor scale [*Pseudaonidia duplex*, Ckll.].

Runner (G. A.) & Bliss (C. I.). U.S. Bur. Ent. **The Three-banded Grape Leafhopper and other Leafhoppers injuring Grapes.**— *Jl. Agric. Res.*, xxvi, no. 9, pp. 419–424, 2 pls. Washington, D.C., 1st December 1923.

The systematic and ecological relationships of the leaf-hoppers occurring on grape vines as studied during the present investigations are described. The paper is mainly devoted to *Erythroneura tricincta* var. *cymbium*, McAtee (three-banded grape leaf-hopper) because of its economic importance as a pest of grapes. In numerous localities on the Lake Erie Islands and the Sandusky region a large portion of the fruit failed to ripen during 1922 owing to its presence in unusual numbers. The distribution of this species is given, and the seasonal colour changes of the adult are described.

In its main characteristics this species has a very similar life-history to *E. comes*, Say. The winter is passed in the adult stage in or near the vineyards, the grape foliage being attacked in the spring. The eggs are laid just beneath the epidermis on the lower surface of the older leaves. The period of incubation varies from 11 to 17 days for the first generation and from 12 to 17 days for the second. The nymphal stage lasts from 20 to 22 days in the first brood and 24 in the second. It is passed for the most part on the leaves where the insects have hatched. The first adults of the first brood were found 2nd July, eggs being laid 26th July, the adults of the second generation hibernate, though there is a possibility of a third generation ; the hibernating individuals are only dormant at temperatures below freezing. Various plants are attacked in the early spring before the grape leaves appear, but breeding has not been observed on any plant other than grape.

The control experiments carried out in the vineyard districts of northern Ohio have given similar results to those reported by previous workers. Spraying against the adults is not effective. Against the nymphs a nicotine spray, 1 : 1,200, with resin fish-oil soap as a spreader, thoroughly applied to the lower surfaces of the leaves, is recommended. The spray boom as recommended by DeLong was found more satisfactory and less expensive than trailer spraying [*R. A. E.*, A, x, 306].

The author gives the following particulars of the grape leaf-hoppers from the Sandusky region :—*Erythroneura tricincta* var. *cymbium*, McAtee, on the whole the most injurious and most common form in commercial grape-growing centres west of Cleveland ; *E. comes* var. *compta*, McAtee, in large portions of the Lake Erie Island grape belt of greater economic importance than *tricincta* ; *E. comes* var. *comes*, Say, the traditional grape leaf-hopper of economic importance, chiefly on the mainland east of Sandusky ; *E. vitifex*, Fitch, difficult to separate from *E. comes* except by dissection, hence of doubtful distribution, although apparently common in the Lake Erie Island region, especially on thin-leaved grapes ; *E. vulnerata*, Fitch, very widely distributed, but usually unnoticed because of its different habits ; *E. ziczac*, Walsh, common on thin-leaved grapes throughout the belt ; and *E. vitis*, Harris, restricted to thin-leaved grapes and dominant on wild *Vitis vulpina*.

Eight additional forms also occur in the Sandusky region, usually in smaller numbers and chiefly on wild grape.

RUGGLES (A. G.). **Pioneering in Economic Entomology.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 34–41. Geneva, N.Y., February 1924.

The gradual evolution of the work of the economic entomologist as it appears to-day is traced from the earliest records of workers in this field. Ecology is considered the most promising branch of economic entomology, but a broad and fundamental training in the sciences is necessary.

SIMMONS (P.) & ELLINGTON (G. W.). U.S. Bur. Ent. **Biology of the Angoumois Grain Moth—Progress Report.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 41–45. Geneva, N.Y., February 1924.

Sitotroga cerealella, Ol. (Angoumois grain moth) was unusually injurious during 1922, causing heavy losses to wheat, particularly in the wheat-growing areas of the Atlantic coast. From recent observations on the biology of this pest it is evident that as many as 283 eggs may be laid by one moth ; under laboratory conditions these were inserted between two pieces of cardboard clipped together, the presence of grain apparently not being required as a stimulus to oviposition. In hot weather, in newly harvested wheat, the life-cycle may be slightly under 5 weeks, only 28 days being required from the hatching of the egg to the emergence of the adults. Under certain conditions the availability of water affects the egg-laying powers of the females ; further experiments are, however, necessary to decide the relation to fecundity of the moisture content of the grain during immature life and of the air humidity during adult life in the absence of a supply of drinking water.

GIBSON (A.). **The Occurrence of the Tortricid, *Cacoecia rosana*, L., in Canada.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 51–54. Geneva, N.Y., February 1924.

Tortrix (*Cacoecia*) *rosana*, L., has been known as a pest in North America for a number of years, *T.* (*C.*) *hewittana*, Busck, under which name it was erroneously recorded from Nova Scotia as a new species, being a synonym of it. The larva has a wide range of food-plants in Canada. In Nova Scotia it has been found on raspberry,

currant, hawthorn, lilac and sycamore; in British Columbia on *Crataegus*, hazel, birch, cherry, privet, *Platanus*, American elm [*Ulmus americana*], maple, oak, lime (*Tilia*), laurel, lilac, rose, black currant, loganberry, willow, wild plum, poplar and blackberry; during 1923 it was also recorded from apple, plum, pear, ash and European broom (*Cytisus scoparius*). In Canada its distribution appears to be limited to Nova Scotia and British Columbia. The eggs are laid on the bark in a mass and overlap, the number in each mass varying from 23 to 102, with an average of 60. In British Columbia they begin to hatch about the middle of April, though the actual date depends on the plant on which they are laid. Pupation occurs about July amongst the leaves where the larvae have been feeding and lasts from 10 to 16 days. From the material collected in Novia Scotia one species of *Angitia* was reared, and from British Columbia two species of *Angitia* and one of *Ephialtes*, all probably undescribed.

The egg masses have been successfully destroyed by spraying with miscible oil applied at the rate of 1–12 and 1–15 during the first half of April. The spray recommended against the larvae consists of 1 oz. nicotine sulphate 40 per cent., 8 oz. fish-oil soap, 2 oz. lead arsenate powder and 3 gals. water, to be applied as often as necessary, particularly against the young larvae.

WEBSTER (R. L.). **Factors affecting Damage to Crops by Insects.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 54–59. Geneva, N.Y., February 1924.

The following is taken from the author's abstract of this paper: The real significance of much insect damage is not fully appreciated, since it is often concealed. Much injury by insects is attributed to other factors. The severity of damage by insects may be influenced greatly by temperature and moisture. Crops, the growth of which is retarded primarily because of lack of moisture, will suffer more injury when attacked by insects than other crops not so retarded. Various types of soils in turn affect the severity of insect damage because of differences in their water-holding capacity.

HAMLIN (J. C.). **The Australian Prickly Pear Problem.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 60–64. Geneva, N.Y., February 1924.

About fifteen species of *Opuntia* have become naturalised in Australia, the bulk of the cactus area being covered by the common pest pear (*O. inermis*) and the spiny pest pear (*O. stricta*). The work in connection with the attempted control of these noxious plants is briefly reviewed, and the recent introduction of insect enemies from America is discussed [*R.A.E.*, A, ix, 565; x, 415].

The efficiency of *Dactylopius tomentosus*, Lamarck, is lessened by the presence of the Coccinellid, *Cryptolaemus montrouzieri*, Muls.

Though complete eradication of these plants is beyond reasonable expectation, biological control is quite within the realm of possibilities.

FELT (E. P.). **The Gipsy Moth Problem in New York State.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 64–67. Geneva, N.Y., February 1924.

The importance of preventing the further spread of *Porthetria dispar*, L. (gipsy moth) in New York [*R.A.E.*, A, xi, 300, 359] is pointed out.

The work in this connection should be carried out in the coming spring, the aid of the Federal Government in the matter being considered essential.

CROSSMAN (S. S.) & WEBBER (R. T.). U.S. Bur. Ent. **Recent European Investigations of Parasites of the Gipsy Moth,** *Porthetria dispar* **L., and the Brown-tail Moth,** *Euproctis chrysorrhoea* **L.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 67–76. Geneva, N.Y., February 1924.

The work of introducing parasites of *Porthetria dispar*, L., into the United States was begun in 1901, since when a total of 36 species of Tachinid and Hymenopterous parasites and 10 beneficial Coleoptera have been imported, of which 15 have become established. These are, besides those already mentioned [*R.A.E.*, A, xi, 161, 555], *Eupteromalus nidulans*, Först., *Hyposoter disparis*, Vier., *Carcelia laxifrons*, Vill., *Sturmia gilva*, Hart., *Carabus auratus*, L., and *C. nemoralis*, Mull. *Compsilura concinnata*, Meig., is being recovered from native insect hosts 60 miles beyond the gipsy-moth quarantine line.

A further search for parasites was made in Europe in 1922, but the gipsy-moth infestations encountered were very slight in most cases. In Spain a severe infestation was found in the Royal Forest, but although it was of several years' standing, no dead or dying trees were observed. Empty cocoons of *Apanteles vitripennis*, Hal., were found in large numbers [*cf. R.A.E.*, A, xi, 579] ; in Sicily this species was outnumbered by *A. melanoscelus*, Ratz., the latter being now well established in the United States [*R.A.E.*, A, x, 403]. Various countries in Europe were again visited in 1923 with the same object, the results being very similar to those of the previous year, except that the infestations in Spain were much heavier, and those in Germany had increased slightly. Eventually a suitable field for work was discovered in a district about 120 miles east of Budapest near the Rumanian frontier. The forest in this district covers several square miles, and much of it is a solid stand of locust trees (*Robinia pseudacacia*), with smaller areas of mixed growth including also *Quercus*, *Populus* and *Salix*, the oak predominating. Except for the solid stand of locust trees the conditions are very similar to those in southern Massachusetts. The gipsy-moth infestation was of medium density and was in the mixed growth. Of the 700 larvae collected in this district 71 per cent. were killed by parasites, *Parasetigena segregata*, Rond., being responsible for 40 per cent., *Blepharipa scutellata*, R.D., for 24 per cent., and *Tachina larvarum*, L., and *Sturmia gilva*, Hart., for about 3 per cent. each. The other parasites found were *Lydella nigripes*, Fall., *Carcelia gnava*, Meig., *Zenillia libatrix*, Panz., *Compsilura concinnata*, Meig., and *Apanteles fulvipes*, Hal. All these species have been introduced into the United States. It seems rather doubtful at present whether *A. fulvipes* can be established in New England, owing to its need of a suitable hibernating host. *Parasetigena segregata* has been reared from other hosts, but these are apparently not essential ; it is single-brooded, and there is every reason to anticipate its establishment in New England. The other species are being used for life-history investigations, and have not yet been reared in sufficiently large numbers for liberation.

Though excellent results have so far been obtained with the introduction of insect enemies of *Porthetria dispar* and *Nygmia phaeorrhoea*,

Don. (*Euproctis chrysorrhoea*, L.), they have not yet been sufficient to prevent the increase of these pests. Several of the introduced parasites are attacking many native insects, as well as the recently introduced European pest *Stilpnotia salicis*, L.

The factors affecting the periodical outbreaks of *P. dispar* and *N. phaeorrhoea* followed by an almost complete disappearance of these insects, as occurring in Europe, have still to be discovered and should be thoroughly studied in an endeavour to introduce as many as possible of the beneficial insects into the infested area in America.

The transportation of the parasites from Europe to America was very difficult. The sudden change in temperature and humidity that accompanies the placing of Tachinid puparia or *Apanteles* cocoons in cold storage is apparently harmful to the development of the insects, especially at the time of transformation from larvae to pupae and adults. The final results of the transportation experiments will not be available until spring emergence is complete. From the appearance of the parasites on arrival, however, it appears that cold storage will have to be used for the summer-issuing Tachinids and *Apanteles*, at least until a more satisfactory method is developed. A few Tachinid puparia packed in pillboxes arrived in better condition than those in the larger containers, and slightly damp sawdust is better for these species than moss. The sawdust used was apparently from hard wood and was very fine. Upon arrival the steamers were met and the material taken directly to the Gipsy Moth Laboratory, where the packages were opened in a room so as to prevent the escape of any hyperparasites.

Clausen (C. P.) & King (J. L.). U.S. Bur. Ent. **A Preliminary Report on the Foreign Parasites of** *Popillia japonica*.— *Jl. Econ. Ent.*, xvii, no. 1, pp. 76–79. Geneva, N.Y., February 1924.

Since 1920 investigations have been carried out at first in Japan and later in Korea with a view to the transportation of natural enemies of *Popillia japonica* to America. This beetle is found on all of the main islands of Japan, but does not extend to the Asiatic mainland, and is most abundant in the northern half of Japan in a habitat corresponding to that of the north central States of America. Nowhere is it an economic pest. Its life-cycle differs somewhat from that in America. At Yokohama one complete generation occurs each year, the adult beetles being present only from late in May to the end of July. About 300 miles north of Tokyo the cycle corresponds quite closely to that in New Jersey, except that possibly 25–30 per cent. have a two-year cycle. At Sapporo in the most northern island, about 900 miles north of Tokyo, the cycle is largely two years, and in the years when the beetles are abundant, they may be found from early July to September, whereas during the alternate years they disappear either before or shortly after the first of August. In Korea three species of *Popillia* are found, but none of them is of any economic importance.

Three Tachinids were found in Japan as parasites of the adults. *Centeter cinerea*, Aldr., is found only in the northern sections of Japan, under climatic conditions resembling those of New Jersey. One generation is produced each year, the adults appearing a little before those of the host. The parasitism of female beetles in Sapporo in 1920 and 1922 exceeded 99 per cent., and this within two weeks of the emergence

of the beetles. As many as 14 eggs were found on a single beetle in the field, and of all eggs deposited from 70–99 per cent. were upon female beetles. During the alternate years 1921 and 1923 the parasitism was slightly less than 50 per cent., with between 98 and 100 per cent. of the eggs on female beetles. This biennial rise and fall is closely correlated with the largely two-year cycle of the host. At Koiwai, where the beetle is fairly abundant each year, the parasitism ranged from 75-90 per cent. during the four years' observations. During the past three seasons a total of 296,000 parasitised beetles have been collected, as many as 56,000 having been found in a day, and the puparia from these shipped to New Jersey.

Of the other two Tachinids, *Eutrixa* sp. is very rare and of much less value than *C. cinerea* or *Ochromeigenia ormioides*, Towns. The latter is more or less common in the warmer sections, particularly at Yokohama. The life-cycle occupies about 20 days, allowing nearly 3 or 4 full generations a year. This parasite has also been recorded from Java, Manchuria, Western China and Korea, and attacks several species of *Anomala* as well as *Popillia*.

Three parasites were found attacking the larvae of *P. japonica* in Japan. A Dexiid, *Prosena siberita*, F., occurring commonly throughout Japan and Korea, parasitised about 10 per cent. The larvae are deposited on the surface of the soil and burrow about in search of the host larvae, in which they develop. There is one generation a year. This fly exhibits a high degree of adaptability as regards climatic and soil conditions.

The only predator considered for importation into America was the Carabid, *Craspedonotus tibialis*, which was abundant in certain sandy districts, but, though some 17,000 adults were forwarded, they were apparently unable to survive under the changed conditions.

In Korea 3 species of *Tiphia* were found parasitising *Popillia* sp., and under experimental conditions developed equally well on *P. japonica*. The normal host of one of these species is *Anomala*. *Campsomeris* sp. develops equally well on the larvae of *Anomala* and *Popillia* in Korea and has a total life-cycle of 6 weeks, so that the value of this Scoliid against *P. japonica* in America would depend on the presence of some alternate host on which the midsummer generation could develop. *Dexia* sp. parasitises *Popillia* and other larvae in Korea, but unlike the Japanese species, it has 3 full generations each year. It is probable that most Dexiids that parasitise Scarabaeids are only able to pass through the latter larval stages and pupate in larvae that are themselves undergoing histolytic action preparatory to pupation. If this is so, the value of the Korean species in America would depend on the presence of additional hosts that pupate at the required time.

With the exception of one of the species of *Tiphia*, all the above mentioned enemies are to be introduced into America in sufficient numbers to establish them if possible.

READIO (P. A.). **Notes on the Life History of a Beneficial Reduviid, *Sinea diadema* (Fabr.), Heteroptera.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 80–86, 2 figs. Geneva, N.Y., February 1924.

The predacious Reduviid, *Sinea diadema*, F., is widely distributed over North America and is a generally beneficial species attacking

various insect pests. The author has fed it on a wide variety of Lepidopterous larvae, Aphids, leafhoppers, small grasshoppers, the tarnished plant bug [*Lygus pratensis*, L.] and other Capsids, weevils, small leaf beetles and many other injurious insects. Details are given of its seasonal life-history, and the various nymphal instars are described.

PETERSON (A.). **Some Chemicals attractive to Adults of the Onion Maggot** (*Hylemyia antiqua* **Meig.**) **and the Seed Corn Maggot** (*Hylemyia cilicrura* **Rond.**).— *Jl. Econ. Ent.*, xvii, no. 1, pp. 87–94. Geneva, N.Y., February 1924.

The following is taken from the author's abstract of this paper: The adults, males and females, of *Hylemyia antiqua*, Meig. (onion maggot) and *Phorbia* (*H.*) *cilicrura*, Rond. (seed corn maggot) are attracted in large numbers to sweetened baits containing small amounts (1–2 drops to 5cc.) of several alcohols, particularly allyl alcohol, isopropyl alcohol, ethyl alcohol and butylic alcohol. The first two were the most attractive, and honey and water was the best medium. Sweetened media, particularly treacle, honey or brown sugar, containing yeasts, also proved to be highly attractive to both species of flies.

The baits containing alcohol lost their attractiveness as soon as the alcohol evaporated. This usually occurred 24 to 48 hours after they were placed in the field. Baits containing yeasts remained attractive 14 to 21 days or longer, provided they were not allowed to become dry.

Sodium arsenite added to baits containing alcohols in amounts as large as ¼ ounce to 1 U.S. quart of bait did not bring about a perceptible change in the attractiveness of the bait, but this amount of sodium arsenite added to yeast baits apparently killed the yeast organism, for there was a marked diminution in the attractiveness of the bait, particularly with those made from dry yeast. In a number of experiments, where sodium arsenite was used, at the rate of ¼ ounce to 5 U.S. quarts of the bait, especially where wet yeast was employed, the attractiveness of the bait was not materially reduced. Further experiments may show that very small amounts of sodium arsenite (sufficient to kill the flies) may be added to sweetened yeast baits without diminishing the attractiveness of the bait.

GLASGOW (H.) & GLOYER (W. O.). **The Mercuric Chloride Treatment for Cabbage Maggot Control in its Relation to the Development of Seed-bed Diseases.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 95–101. Geneva, N.Y., February 1924.

The following is the authors' abstract of this paper: *Rhizoctonia* and some of the other common diseases of cabbage seed-beds are held in check by applications of mercury bichloride solution as used in the control of *Phorbia* (*Chortophila*) *brassicae*, Bch. (cabbage maggot). The other two methods in common use for maggot control, the cheese-cloth screen and applications of tobacco dust, appear to favour the development of such fungous troubles, especially during wet seasons. Applications of mercury bichloride that give the most satisfactory control of the root maggot [*cf. R. A. E.*, A, xi, 235, 253, etc.] also appear best adapted to the control of the diseases studied. One very early application followed by one or two later applications at intervals of a week or ten days, gave the best results.

Frost (S. W.). **Four Year Experiments on the Control of the Red Spider.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 101–104. Geneva, N.Y., February 1924.

The results of four years' work in connection with the control of *Paratetranychus pilosus*, C. & F. (red spider), on apple trees in Pennsylvania, show that various miscible oils are effective as delayed dormant sprays. Though a large number of the winter eggs are killed by these applications, they cannot be relied upon entirely, as the few eggs that hatch are sufficient to reinfest the tree and produce an outbreak. Lime-sulphur was not satisfactory against the winter eggs. Summer applications of sulphur sprays are recommended; their superiority over dusts [*R. A.E.*, A, xi, 253] indicate the possible importance of water and pressure in the control of this mite.

Moore (W.). **Calcium Cyanide.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 104–106. Geneva, N.Y., February 1924.

The methods of manufacture, chemical composition and the reactions which make calcium cyanide a promising insecticide, are discussed.

The author's summary is as follows:—Calcium cyanide is a crude cyanide, which reacts with atmospheric water vapour producing hydrocyanic acid. In contact with a quantity of water it forms a solution and does not liberate its hydrocyanic acid. If the moisture is just sufficient to wet the material, a different reaction occurs with the production of ammonia and other little known compounds. The success of calcium cyanide dust for the control of insects depends upon exposing the insects to a high concentration of hydrocyanic acid gas for a very short time. Calcium cyanide dust should not be mixed with materials that contain moisture or with acid materials, such as dusts containing nicotine sulphate.

Smith (L. B.). U.S. Bur. Ent. **The Japanese Beetle Status in 1923.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 107–111. Geneva, N.Y., February 1924.

Since its discovery in New Jersey in 1916 *Popillia japonica*, Newm. (Japanese beetle) has spread considerably, and the infestation has increased in density [*R. A.E.*, A, xii, 165]. The introduction of parasites from Japan is referred to [*R. A.E.*, A, xii, 172], and the studies on native insect enemies are discussed. Of the latter, Tabanids and Asilids destroy a large number of larvae in low marshy situations, and are assisted by the Therevid, *Psilocephala* sp. Observations on bacterial and fungous diseases show that under laboratory conditions certain of them, particularly *Isaria*, are very effective in destroying the larvae, though under field conditions the virulence of the fungus is not apparent.

Previous experiments had shown that heavy applications of lead arsenate repelled the beetles from foliage; and in 1923 excellent results were obtained on fruit and shade trees by spraying with 3 lb. lead arsenate powder to 50 U.S. gals. water, with the addition of 2 lb. flour as an adhesive. This protected both the foliage and the fruit. The spray is most effective if applied between 10th and 20th June. In the event of very heavy rains the application should be repeated during the first two weeks in July. Towards the end of the season a method was developed whereby lead arsenate can be coated

and used as a spray, though particulars of the process are not given. Under experimental conditions coated lead arsenate proved very satisfactory, it was more readily eaten by the beetles, had more sticking quality and produced less scorching than the non-coated lead arsenate.

Some of the higher alcohols and phenols at low concentrations proved distinctly attractive ; in one case beetles fed for 24 hours on an apple tree that had been sprayed with an attractant although the foliage was heavily coated with lead arsenate ; if the odour is strong, however, the beetles are repelled. Efforts are being made to incorporate an attractive material in sprays in such a manner that the odour is given off slowly and for a considerable period of time.

For the destruction of the larvae in lawns and golf courses the following mixture should be applied at the rate of 3 U.S. pints per square foot : 1 part resin fish-oil soap, 3 parts water and 10 parts carbon bisulphide, constituting a stock solution to be diluted with 50 gals. of water to every quart of emulsion.

Between 40 and 50 per cent. of the larvae in grass land may be destroyed by late autumn and early spring ploughing and cultivation.

CAFFREY (D. J.). U.S. Bur. Ent. **Research Projects and a Synopsis of Results in European Corn Borer Work.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 112–117. Geneva, N.Y., February 1924.

The following is the author's abstract of this paper :—Investigations of *Pyrausta nubilalis*, Hb. (European corn borer) have shown that as a supplement to the utilisation or destruction of infested plants, a system of varietal selection, plus a proper planting schedule and the thorough ploughing under of infested crop remnants and weeds, especially during the late autumn, are very effective cultural practices in combating the corn borer. The tendency of the larvae to migrate from their food-plant, when roughly handled or imperfectly ploughed under, and the ability of such larvae to hibernate successfully with only a slight amount of protection, renders it necessary to utilise or destroy infested material with the minimum amount of handling, and to plough under deeply and cleanly. In areas where two generations occur, weeds are found infested, even under conditions of sparse infestation.

The reduction in yield of grain caused by injury to the stalk is very important, and in New England during 1923 the loss from this source ranged from 8 to 30 per cent. by weight, in fields representing average infestation.

Insecticide investigations have not yet revealed any treatment that can be recommended. Winter mortality of the larvae has averaged 8·5 per cent. during the past four years. Activities of birds, especially woodpeckers, reduced the numbers of overwintering borers by 72 per cent. in certain localised areas.

During 1923 there occurred a marked reduction of infestation in New England and in New York, though there was an appreciable increase in Ohio and Michigan.

JONES (D. W.). U.S. Bur. Ent. **Parasite Introductions : European Corn Borer** (*Pyrausta nubilalis*, **Hübn.**).—*Jl. Econ. Ent.*, xvii, no. 1, pp. 117–120. Geneva, N.Y., February 1924.

Native parasites of *Pyrausta nubilalis*, Hb., in Massachusetts are negligible at the present time, except the egg parasite, *Trichogramma*

minutum, Riley, which fluctuates greatly in numbers from year to year.

Of the parasites imported from France the Tachinid, *Zenillia roseanae*, B. & B., and the Hymenoptera, *Eulimneria crassifemur*, Thom., *Angitia* (*Dioctes*) *punctoria*, Roman, *Habrobracon brevicornis*, Wesm., and *Exeristes roborator*, F., have already been liberated, and at least one other species, *Microgaster tibialis*, Nees, will probably be liberated during 1924.

Brief notes are given on the habits of these parasites. They comprise those of importance found in France and Italy, and it is hoped that valuable additions may be made from Hungary and Japan.

Babcock (K. W.). U.S. Bur. Ent. **Environmental Studies on the European Corn Borer** (*Pyrausta nubilalis*, **Hübn.**).— *Jl. Econ. Ent.*, xvii, no. 1, pp. 120–125. Geneva, N.Y., February 1924.

The following is the author's abstract of this paper.

This article contains a summary of research in connection with the investigations of the seasonal history of *Pyrausta nubilalis*, Hb. (European corn borer) in various localities, consisting of three main lines; first, the possibility of two distinct species occupying areas of diverse seasonal history; second, the possibility of a geographic race; third, the intimate study of the environment. The third section of the investigation is particularly reviewed, the author attempting to emphasise the impracticability of predicting seasonal history on the basis of temperature correlations alone. There is also a review of the methods of studying seasonal history in relation to various types of environment as well as summaries of experiments upon the rest period, indicating the far-reaching effect of moisture fluctuation during this period upon further development.

The importance of obtaining detailed information upon the physiology during the critical life periods is emphasised, as well as the desirability of making a careful European survey of the insect's seasonal history with a view to obtaining biologically accurate means for appreciating the potentiality of the insect in various types of climate.

Huber (L. L.) & Neiswander (C. R.). **European Corn Borer Investigations in Ohio.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 125–128. Geneva, N.Y., February 1924.

This is a preliminary report on the work done by the Ohio Experiment station during 1923 in connection with *Pyrausta nubilalis*, Hb. (European corn borer). A brief summary is given of the life-history as occurring under Ohio conditions, there being apparently only one generation a year. Birds appear to be of little use in checking the pest, and there are very few insect enemies, parasitism by *Exorista nigripalpis*, Towns., amounting only to 1·7 per cent.

The effectiveness of the clean-up methods carried out during the spring of 1923 cannot yet be accurately estimated, though a study of infested stalks shows that the stubble left in the field must be considered in future control measures. Borers were found not higher than 6 inches from the ground level in 47 per cent. of the stalks examined, and some even below the surface level. Smartgrass, pigweed and ragweed are recorded as food-plants.

Although the borer has increased in numbers during the past season, no commercial damage has been done.

PARKS (T. H.). **The European Corn Borer, Clean-up Methods.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 141–147. Geneva, N.Y., February 1924.

The clean-up operations carried out against *Pyrausta nubilalis*, Hb. (European corn borer) in Ohio during the spring of 1923 are described in detail. A maize burning week was instituted during April ; the results, however, show that owing to stubble infestation and migration from areas outside, the burning of surplus stalks is only partly effective and not sufficient in itself to prevent a rapid increase of the moth. The work for 1924 includes burning for all infested townships in the ten counties, by which means it is hoped at least to reduce the normal increase of the borer.

WORTHLEY (L. H.). **Operation of Quarantine no. 43 on account of the European Corn Borer.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 149–159. Geneva, N.Y., February 1924.

The operation of quarantine no. 43 on account of *Pyrausta nubilalis*, Hb. (European corn borer) in the United States of America is briefly reviewed.

CAESAR (L.). **Measures Recommended for the Control of the European Corn Borer in the Province of Ontario.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 128–132. Geneva, N.Y., February 1924.

Pyrausta nubilalis, Hb. (European corn borer) has only one generation a year in Ontario and feeds almost entirely on maize. This as well as the general conditions make control measures easier in Ontario than in the United States. In the extreme south-western part of the Province however, problems similar to those in the United States will arise. The recommendations here made for the control of *P. nubilalis* are applicable to the whole of the rest of Ontario [*cf. R. A. E.*, A, xi, 292].

CRAWFORD (H. G.). **Ploughing as a Factor in Control of the European Corn Borer** (*Pyrausta nubilalis* **Hübner**) **in Ontario, Canada.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 132–141. Geneva, N.Y., February 1924.

In view of the considerable difference between the published general statements in the United States of America and Canada on the question of ploughing as a factor in the control of *Pyrausta nubilalis*, Hb., the Canadian records are reviewed in detail [*R. A. E.*, A, x, 482 ; xi, 292, 498].

MCLAINE (L. S.). **Corn Borer Legislation in Canada.**— *Jl. Econ. Ent.*, xvii, no. 1, pp. 147–149. Geneva, N.Y., February 1924.

In this article the legislation concerning the European corn borer [*Pyrausta nubilalis*, Hb.] in Canada is briefly reviewed.

BRISLEY (H. R.) & CHANNEL (R. A.). **The Oak Girdler,** *Oncideres quercus* **Skinner.**— *Jl. Econ. Ent.*, xvii, no. 1, p. 159. Geneva, N.Y., February 1924.

The Lamiid, *Oncideres quercus*, Skinner (oak girdler) is recorded as attacking the young succulent shoots of oak in Arizona, where during

the winter months these shoots form almost the only food of the open range stock. The eggs are inserted between the bark and the wood. The adults feed on the tender bark at the tips of the shoots, particularly around the leaf buds. The girdled limbs are from 1 to 3 feet long and about ½ inch in diameter.

HORSFALL (J. L.). **Possibilities of Granular Calcium Cyanide as a Control Measure for Wireworms.**— *Jl. Econ. Ent.*, xvii, no. 1, p. 160. Geneva, N.Y., February 1924.

Wireworms were particularly injurious to early cabbage during May and June 1923 in Pennsylvania ; in some fields as many as 25 individuals were taken from the roots of a single plant. Both poison bran bait and mercury bichloride (corrosive sublimate) proved useless. Satisfactory results were eventually obtained by placing 6 to 8 grammes of granular calcium cyanide 3 inches from each plant in a furrow left by cultivation. In some cases the cyanide was covered, in others left exposed, this, however, appeared to make no difference. By this method 81 per cent. of the wireworms were killed, but some injury to the plants occurred, which was apparently due to the weakened root systems. Uninfested plants treated two weeks after transplantation with doses varying from 5 to 10 grammes each were not affected, but those treated with 12, 14 and 16 grammes respectively were killed.

YOTHERS (W. W.). **Spraying for the Control of Insects and Mites attacking Citrus Trees in Florida.**— *U.S. Dept. Agric.*, Farmers' Bull. 933, 44 pp., 27 figs. Washington, D.C., June 1922. [Received 3rd March 1924.]

This is a revision of a bulletin previously noticed [*R. A. E.*, A, vii, 106] and gives information regarding spraying for *Citrus* pests under Florida conditions, with instructions on equipment and the preparation of effective insecticides, a spraying schedule that is the result of several years' practical experience being included.

CAMPBELL (R. E.). **Nicotine Dust for Control of Truck-crop Insects.**— *U.S. Dept. Agric.*, Farmers' Bull. 1282, 24 pp., 14 figs. Washington, D.C., September 1922. [Received 3rd March 1924.]

The advantages of nicotine dust over liquid sprays for the control of injurious insects on vegetable crops are pointed out, and instructions in its preparation and use are given, with descriptions of suitable machinery.

CAFFREY (D. J.) & WORTHLEY (L. H.). **The European Corn Borer and its Control.**— *U.S. Dept. Agric.*, Farmers' Bull. 1294, 44 pp., 24 figs. Washington, D.C., 1922. [Received 3rd March 1924.]

A detailed account is given of the life-history and habits of *Pyrausta nubilalis*, Hb. (European corn borer) in the United States of America, the injury it causes and the insects that may be mistaken for it. Recommendations are also made for its control, these including the protection of greenhouse plants and measures adapted for market gardens, as well as measures that are effective under restricted conditions.

A summary of the quarantine regulations concerning *P. nubilalis* is also given.

Godfrey (G. H.). **Root-knot: its Cause and Control.**— *U.S. Dept. Agric.*, Farmers' Bull. 1345, 26 pp., 26 figs. Washington, D.C., October 1923.

This is a revision and extension of Farmers' Bulletin no. 648, and gives an account of the Nematode, *Heterodera radicicola*, which is the cause of root-knot in plants. Suitable crop rotations for the reduction of Nematodes are recommended, and the method of keeping the land free of vegetation for 2 years is recognised as the most effective remedy, though it is not always practicable.

Siegler (E. H.) & Daniels (A. M.). **Lime-sulphur Concentrate. Preparation, Uses and Designs for Plants.**— *U.S. Dept. Agric.*, Farmers' Bull. 1285, 41 pp., 37 figs. Washington, D.C., December 1922. [Received 3rd March 1924.]

Formulae and suggestions are given for making, storing and diluting lime-sulphur concentrate. Suggestions are also given on the building of several types of cookers of different sizes, from a very simple 25-gal. kettle to steam plants in which 800 gals. of concentrate can be prepared at one cooking.

Yoder (P.A.) & Ingram (J. W.). **Hot-water Treatment of Sugar-cane for Insect Pests. A Precaution.**— *U.S. Dept. Agric.*, Dept. Circ. 303, 4 pp. Washington, D.C., December 1923.

Experiments in hot-water treatment of sugar-cane for the control of *Diatraea saccharalis crambidoides*, Grote (sugar-cane moth borer) and *Pseudococcus calceolariae*, Mask. (sugar-cane mealybug) have led to the conclusion that it is unsafe to subject to the treatment (for 30 minutes at 122°F.) cane that has sprouted extensively during winter storage, or if such cane is subjected to the treatment, it may be necessary to plant much more closely in order to secure a normal stand.

Isely (D.) & Ackerman (A. J.). U.S. Bur. Ent. **Life History of the Codling Moth in Arkansas with Special Reference to Factors limiting Abundance.**— *Arkansas Agric. Expt. Sta.*, Bull. 189, 57 pp., 3 pls., 3 figs. Fayetteville, Ark., December 1923.

A study has been made of the codling moth [*Cydia pomonella*, L.] in Arkansas during 1918–21. The factors limiting oviposition in spring are of particular importance. Oviposition is almost entirely confined to night-time with temperatures above 62°F. If low night temperatures prevail during May, few eggs may be deposited and only a small spring generation will result. If, however, night temperatures are favourable during the period of emergence of the overwintering generation, severe infestation may be expected. Local variations in temperatures at night will affect the local severity of infestation. Short crops, natural enemies and differences in the varieties of apples in an orchard are also responsible for varying degrees of infestation. The date of hatching of first generation larvae may be forecasted by the temperature records for the hour following sunset. In an ordinary season oviposition may be expected to begin on the first night when the temperature for this period is above 62°F, provided this night is at least 2 weeks after the petals fall. This method of calculating needs further confirmation before it can be definitely recommended.

The spray most commonly used is 1 lb. powdered lead arsenate to 50 U.S. gals. of liquid, 6 or 7 applications generally being necessary. The first, or calyx spray, is made after 90 per cent. of the petals have fallen and before the calyx cups close; the time for this has no relation to seasonal history, the poison being directed against larvae of all generations attempting to enter at the calyx end of the apple. Against larvae of the first generation two (or, in cases of extended hatching, three) cover sprays are recommended, the first to finish when the larvae begin to hatch, and the second to finish just before the maximum hatching of the first generation. Three or four applications against the summer generation are necessary, the first to finish just before the hatching of the second generation, the others at intervals of 3 weeks. These sprays are generally combined with a fungicide, such as Bordeaux mixture or lime-sulphur solution, and should be applied with a power sprayer maintaining about 225 lb. pressure, the spray rods being equipped with angle nozzles, the most satisfactory size of perforations being $\frac{1}{16}$ in. for the calyx spray and $\frac{1}{24}$ in. for subsequent applications.

Isely (D.) & Baerg (W. J.). **The Boll Weevil Problem in Arkansas.**—*Arkansas Agric. Expt. Sta.*, Bull. 190, 29 pp., 8 figs. Fayetteville, Ark., January 1924. [abridged as] **Control of the Boll Weevil in Arkansas.**—*Univ. Arkansas Coll. Agric.*, Extens. Circ. 162, 7 pp., 2 figs. Little Rock, Ark., February 1924.

A general account is given of the cotton boll weevil [*Anthonomus grandis*, Boh.] under Arkansas conditions. The early production of cotton and the destruction of the weevils in hibernation are recommended. Early infestations may be checked by applications of calcium arsenate dust, which should be given only where weevils actually occur, 5 to 7 lb. per acre being used. The treatment should begin when the weevils have punctured 10 to 15 per cent. of the squares, and be continued for 3 or 4 applications at intervals of 4 or 5 days.

Ames (C. T.). **A Progress Report of Boll Weevil Poisoning Work at the Holly Springs Branch Experiment Station.**—*Mississippi Agric. Expt. Sta.*, Circ. 51, 11 pp. A. & M. College, Miss., December 1923.

As the result of experiments against the cotton weevil [*Anthonomus grandis*, Boh.] in Mississippi, it is recommended that poisoning should begin just as the squares begin to form. Where labour is plentiful, a mixture consisting of 1 lb. calcium arsenate to 1 U.S. gal. treacle and 1 U.S. gal. water should be applied to the top bud with a mop, and where labour is scarce, calcium arsenate dust should be applied in the bud with a dusting machine. Earlier than this the poison is useless. About 10 days later a second application of dust should be made by a machine. On hill lands these two applications may be sufficient, but in valleys or lands where cotton grows rank, if infestation reaches 10 per cent., a third application of dust should be made.

O'Kelly (J. F.) & Cowart (R.). **Cotton Experiments, 1923. Varieties, Fertilizers and Weevil Control.**—*Mississippi Agric. Expt. Sta.*, Bull. 219, 11 pp. A. & M. College, Miss., December 1923.

The results of poisoning the boll weevil [*Anthonomus grandis*, Boh.] by the Coad method [*R. A. E.*, A, x, 10] are described, the cost of the

poison and its application being worked out. The average gain per acre is shown to be 635 lb. of cotton. The outstanding drawback to this method is the lack of satisfactory machinery for applying the poison.

BONDAR (G.). **Insectos damninhos ao cacaoeiro.** [Insects injurious to Cacao.]—*Correio-Agricola*, ii, no. 1, pp. 5–14, 8 figs. Bahia, January 1924.

A description is given of *Heliothrips rubrocinctus*, Giard, and of the injury it causes to cacao. In the Brazilian state of Bahia it infests cacao, avocado (*Persea gratissima*), *Terminalia catappa*, guava (*Psidium guayava*), cashew (*Anacardium occidentale*), rose, grape-vine, mango, cotton, etc. Remedies are hardly practicable in view of the extent of the cacao plantations and the scarcity of labour, but the addition of ½ lb. nicotine sulphate to 42 gals. Bordeaux mixture has given good results in Central America. In other countries certain climatic conditions have caused this thrips to disappear, and this may occur in Brazil. The encouragement of the ant, *Azteca chartifex*, Forel, as advised by some authors, is deprecated as it may become very injurious.

The following Membracids attacking cacao are briefly described: *Tragopa humeralis*, Fairm., *T. auriculata*, Oliv., *T. nitida*, Gem., *T. fulvovaria*, Fairm., *Horiola picta*, F., *H. arcuata*, F., and *Bolbonota pictipennis*, Fairm. *Tragopa* spp. introduce their eggs into the tissues of the plants, thus causing wounds. The species of the other genera oviposit on the surface. These Membracids are always associated with ants, including *Dolichoderus attelaboides*, For., *D. bidens*, L., *D. bispinosus*, Olv., *Cremastogaster evallescens*, For., and *Azteca chartifex* For., and the best method of checking the Membracids is by destroying the nests of the ants.

The larva of a Curculionid, *Erodiscus ciconia*, F., bores into the stems and twigs. The adult oviposits in grooves that it makes in the bark, and the newly-hatched larvae at once begin mining. They pupate within the mine. The attack seems confined to cacao trees weakened by over exposure to sunshine, or attacked by other pests. The larva of *E. ciconia* does not seem able to infest healthy trees owing to the exudation of gum.

A[NDREWS] (E. A.). **The Tea Green-fly.**—*Indian Tea Assoc. Sci. Dept. Qtrly. Jl.*, 1923, pt. 4, pp. 109–117, 1 chart. Calcutta, 1924.

With the exception of red spider [*Tetranychus bioculatus*, W. M.] *Empoasca flavescens*, F. (tea green-fly) is the most widely distributed of the major pests of tea in north-east India. Very little has been recorded about this bug, though it has been generally accused of producing a stunted growth in the plants attacked. In the light of recent observations, however, it does not appear to be responsible for this particular injury. All stages of the insect are described. The eggs are laid in the stems and midribs of the leaves of the flush, just below the outer skin; the incubation period is not known. Details are given of the duration of the various larval instars, the adult stage being reached on the average in 9–22 days according to the time of year. The height of the green-fly season is from June to September, when the adults appear 9 days after emergence from the egg. Though they take longer to develop during the cold season, they remain active on the

tea, breeding throughout the year. The shortest period recorded from the emergence of the larva to the appearance of the adult is 5 days. Where a seven day rotation plucking is practised, a large number of the insects are carried away in the leaf before reaching maturity. Most of the eggs deposited after one plucking will probably hatch before the next; the value of this method as a means of control is therefore in the collection of the insects themselves while they are feeding on the flush. Under laboratory conditions the adults lived longer during the cold weather than at the height of the season. The longest period during which the adults remained alive and active was 102 days, after reaching maturity in November. Under these conditions complete eradication of the insect by pruning, etc., in the cold weather can never be expected.

HERING (M.). **Zur Kenntnis der Blattminenfauna des Banats. I-II.** [A Contribution to the Knowledge of the Leaf-mining Fauna of the Banat. I-II.]—*Zeitschr. wiss. Insektenbiol.*, xix, nos. 1 & 2, pp. 1–15, 31–41, 4 figs. Berlin, 31st January & 20th February 1924.

The title of this paper indicates its contents. The Banat is that region of Hungary north of the Danube near the Iron Gates.

VAN POETEREN (N.). **Verslag over de Werkzaamheden van den Plantenziektenkundigen Dienst in het Jaar 1922.** [Report on the Work of the Phytopathological Service in the Year 1922.]— *Verslag. en Meded. Plantenziektenk. Dienst*, no. 31, 59 pp. Wageningen, August 1923. [Received 25th February 1924.]

In some localities in Holland apple foliage was almost completely skeletonised by *Hemerophila* (*Simaethis*) *pariana*, and at Bangert the apple bug, *Plesiocoris rugicollis*, deformed the fruits and caused considerable loss. Young pear trees, planted in 1921 and of retarded development owing to the drought, were mined by *Xyleborus dispar*. Plums were attacked by the leaf-roller *Tortrix* (*Cacoecia*) *rosana*, the only remedy against which is the destruction of the egg-masses, and in Zeeland severe injury was done to plums by *Rhynchites pauxillus*. *T. rosana* continued to injure peach as in previous years. Currants and gooseberries were attacked by *Zophodia convolutella*; the remedy advised was the collection and destruction of infested berries. In one locality caterpillars of *Incurvaria capitella* were abundant; apparently they had not hibernated on the bushes and had therefore escaped a carbolineum spray. Some cucumbers and melons were attacked by a mite, *Tyroglyphus putrescentiae*, this being the first record of such injury in Holland; the frames should be cleaned with a very hot 10 per cent. solution of soda. Spraying with a spirit-soap solution did not prove successful. *Epitetranychus althaeae* infesting cucumbers was checked by fumigating with sulphur. Trap-pots, sunk level with the earth and containing water with a covering of petroleum, proved effective against the Carabid beetle, *Harpalus ruficornis*, infesting strawberries. The foliage of elms was attacked in some localities by *Galerucella luteola* and a Tortricid, *Acalla boscana*. *Cneorrhinus plagiatus* is increasingly injurious to roses; in one nursery 25,000 out of 30,000 grafted roses were destroyed. The oak flea-beetle, *Haltica erucae*, migrated from oaks to roses and severely injured them, but spraying with Paris green proved successful against it. Honeysuckle flower-buds were mined by the caterpillars of *Alucita hexadactyla*.

Oats were attacked by the frit-fly [*Oscinella frit*] and the mite *Tarsonemus spirifex*. *Myzus* [*Myzoides*] *persicae* has again been noticed on potato shoots and may prove important in connection with the transmission of leaf-curl or other diseases. In some localities beets were severely attacked by *Cassida nebulosa*; spraying with a 1 per mille solution of Paris green was recommended against this beetle. The larvae of the rose beetle, *Phyllopertha horticola*, did considerable damage to clover.

Sproein en Sproeiers. [Sprays and Sprayers.]—*Verslag. en Meded. Plantenziektenk. Dienst*, no. 33, 31 pp., 5 pls. Wageningen, February 1924.

This bulletin gives information on the cases where the use of a liquid spray is advisable and on the methods and apparatus to be used.

La Lutte contre les Ennemis de Plantes et le rôle des Stations de Recherches.—*Minist. Agric., Inst. Recherches Agron.*, 11 pp. Paris, Soc. Centrale d'Aviculture de France, 1923.

A brief general account is given of the injury caused by insect pests and the value of the work done against them by the different experimental stations in France. The importance of the natural parasites of these pests and of the growing of immune crops when possible is also pointed out.

Voukassovitch (P.). **Sur la multiplicité des parasites de la Pyrale de la Vigne** (*Oenophthira pilleriana* **Schiff.**).—*C. R. Soc. Biol.*, xc, no. 6, pp. 402–405. Paris, 22nd February 1924.

A list is given of the parasites of *Sparganothis* (*Oenophthira*) *pilleriana*, Schiff., collected in the Haute-Garonne during 1922 and 1923. Of these the more important appear to be *Angitia fenestralis*, Grav., found in the host larva but in turn parasitised by *Pezomachus nigritus*, Först.; *Chalcis intermedia*, Nees, which occurs in the pupae of the host and apparently overwinters in the adult stage, but which is itself parasitised by *Monodontomerus aereus*, Wlk.; *Goniozus claripennis*, Först., an ectoparasite on the host larva, but heavily parasitised during August by *Elasmus flabellatus*, Boy., *Eupelmus urozonus*, Dalm., *Tetrastichus* sp. and four or five species of Pteromalids; and *Apanteles albipennis*, Nees, a parasite of the larvae but less abundant than those previously mentioned. Tachinid parasites were bred from the host pupae, but they were of little importance. In the pupal stage they were themselves occasionally parasitised by *Pteromalus*.

Parasitism is highest in abandoned vineyards. Hyperparasitism increases as the season advances, the 18 parasites recorded in this paper being eventually hyperparasitised by 14 other species.

Juillet (A.). **Le Savon-Pyrèthre.**—*Progrès agric. & vitic.*, lxxxi, no. 9, pp 204–205. Montpellier, 2nd March 1924.

In view of the exaggerated accounts of the insecticidal properties of pyrethrum-soap solution that have been broadcast for commercial purposes, and also of the many fraudulent and adulterated preparations sold under that name, the author discusses the true properties of this insecticide, and points out in particular the non-poisonous nature (as regards man and animals) of the pure product.

MALENOTTI (E.). **Questioni fitopatologiche delle Tre Venezie.** [Phytopathological and Entomological Questions of the Three Venetias.] — 60 pp., 28 pls. Reprint from *Inst. Federale Credito per il Risorgimento delle Venezie, Quaderno mensile,* 1924, no. 2. Venice, 1924.

The region here referred to includes the provinces that have been added to the provinces of Venetia of pre-war days. The following are among the pests dealt with.

The mulberry scale, *Diaspis pentagona,* which was disastrous until checked by *Prospaltella berlesei,* has again increased since 1921, but this is only a passing phase, as *P. berlesei* is firmly established.

In mid-September 1923 it was noticed that a large quantity of olives had fallen from the trees. The fall at this season may be due to several agencies, but in this case the olive moth, *Prays oleellus,* was almost entirely responsible. The first of the three generations of this moth attacks the foliage, the second attacks the flowers and is more harmful, while in the third, which does the greatest harm, the larvae mine the stones of the fruits. This injury is not of direct importance, but such fruit falls before maturity. At present the sole measure adopted consists in shaking the trees in September and in destroying or crushing all fallen olives. In Verona this measure in mid-September is too late, because about 70 per cent of the larvae have already left the fruits. The parasites of *P. oleellus* being of little importance, destruction of the few parasitised larvae present is immaterial; shaking is therefore a valuable measure if done in the second half of August, the exact date depending on repeated local observations. *P. oleellus* is less mobile than the olive fly [*Dacus oleae*] so that simultaneous action throughout a whole district is unnecessary, and an olive plantation may be freed from infestation if others are not too near it; the oil obtained by crushing the fallen olives may pay for the expense of combating the moth.

Phylloxera is rapidly spreading from the hills to the plains. A mite, *Phyllocoptes vitis,* was also recorded on vines.

The black peach aphis, *Anuraphis persicae-niger,* Smith, is chiefly injurious in nurseries. The mines made by *Aegeria* (*Sesia*) *myopaeformis* in the branches of quince result in tumours quite different from the swellings such as are produced in young poplars by *A.* (*Sciapteron*) *tabaniformis. Psylla pyricola* is one of the most serious pests of the pear in some districts. *Gryllus desertus* attacks tobacco when the seedlings are being planted out. Good results were obtained with a bait of damp wheat bran poisoned with 5 per cent. of zinc phosphide.

The late war conditions resulted in an increase of certain pests. The ravages of *Ips typographus* were so widespread and serious that the central government undertook the work against it, which began in mid-April 1922 and lasted 40 days, during which up to 2,000 workmen felled and barked nearly 300,000 spruce trees, and burned the bark and infested twigs. Other less important Scolytids were *Pityogenes chalcographus* and *Xyloterus lineatus.* The pine processionary caterpillar, *Cnethocampa pityocampa,* spread extensively in the pinewoods of the war zone. The collection and burning of the nests was carried out by troops specially detailed for the purpose. The olive borer, *Phloeotribus scarabaeoides,* became firmly established in the district of Limone sul Garda, adjoining Venetia, and which was evacuated by its population in September 1916 and remained unoccupied for 27 months. Individual efforts to check the pest were inadequate and an association was formed

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with the object of carrying out a general campaign. The measures used are pruning of all injured branches, and the collection of these branches (which are highly attractive to ovipositing females) in heaps beneath the olive trees where they remain until early April. They are then removed and immediately burned.

The paper concludes with a description of the organisation of the Plant Protection Service in Venetia, the Italian Service as a whole being briefly outlined as well.*

PAILLOT (A.). **Sur *Thelohania mesnili*, microsporidie nouvelle, parasite des Chenilles de *Pieris brassicae* L.**—*C. R. Soc. Biol.*, xc, no. 7, pp. 501–503, 1 fig. Paris, 29th February 1924.

During 1917 *Perezia mesnili* and *P. legeri* [*R. A. E.*, A, vi, 177, 190] were isolated from the larvae of *Pieris brassicae*, L., taken in the vicinity of Lyons. During 1923 four different species including the above were found in larvae taken in the same locality; the other two are new and one of them, which is here described as *Thelohania mesnili*, was found in the adipose tissues. The larvae infested with it were also parasitised by *Apanteles glomeratus*, but its rôle in the transmission of the microsporidia is not known.

PAILLOT (A.). **Sur la transmission de maladies à microsporidies chez les Insectes.**—*C. R. Soc. Biol.*, xc, no. 7, pp. 504–506, 1 fig. Paris, 29th February 1924.

The various methods by which microsporidia are transmitted are discussed. Some are apparently passed from one generation to another, whilst others, such as *Perezia mesnili*, may be ingested, infections having been produced by this method experimentally. This was also tried with *P. legeri*, but was not successful, the most frequent cause of failure in such experiments being the specialisation of the microsporidia to the tissues attacked. The possibility of transmission by *Apanteles* [*glomeratus*] is also considered.

DELASSUS (—). **Les insectes ennemis de l'olivier en Algérie.**—*Rev. agric. Afr. Nord*, xxii, nos. 239 & 240, pp. 135–139 & 151–155, 6 figs. Algiers, 29th February & 7th March 1924.

In this report, presented to the Congress of Olive-growers at Nice, in October 1921, an account is given of the principal pests of the olive occurring in Algeria. *Saissetia* (*Lecanium*) *oleae* is the most widespread, and is most abundant in the coast regions, in shady, moist situations and in badly kept plantations. It breeds freely on wild olives and rapidly spreads to the cultivated areas. Almost the only treatment attempted, at least by the natives, is a wash given in winter to the trunk and main branches, composed of 5 or 6 lb. iron sulphate and 10 lb. lime to 10 gals. of water. Other formulae recommended against this pest are an emulsion made of 5 lb. saponin (extract of *Sapindus utilis* fruits), 5 gals. paraffin and 25 gals. water; 10 lb. soft soap, 4 gals. paraffin, 10 lb. copper sulphate and 100 gals. water; and

[* We are informed by the author that the species figured on plates xxi and xxii as *Cochliodion limacodes* is really *Apterona crenulella*, Brouard; it causes minor injury to apples.—Ed.

a mixture of 1 part spirits of turpentine in 100 parts 3 per cent. Bordeaux mixture. Lime-sulphur mixtures are seldom used, except in the form of ready-made compounds. The Algerian trees are frequently of a height that renders spraying difficult. A mixture of 15 lb. cresyl, 10 lb. sodium carbonate and 100 gals. water seems to give good results, especially in the Oran district. In some parts of the country, certain insect enemies, such as *Scutellista cyanea* and *Eublemma* (*Thalpochares*) *scitula*, which live on *Ceroplastes* [*rusci*] on figs, check the abundance of the pest. Birds, especially tits, also keep down its numbers.

Aspidiotus hederae (*villosus*) is a less injurious scale that is found particularly in the marshy areas where the trees seem to suffer from too much moisture ; the Coccinellid, *Chilocorus*, and several Hymenoptera serve to keep it in check. The olive Psyllid [*Euphyllura olivina*] is sometimes so numerous, especially in the old olive plantations in the coastal districts, as to ruin the crop ; the lime-sulphur sprays used against *S. oleae* should control it. A Coccid, *Guerinia serratulae*, is troublesome locally but is never more than a minor pest.

Dacus oleae (olive fly), one of the most important olive pests, is present in almost all olive plantations and causes premature falling of the fruit ; infestations are, however, always localised and intermittent, and are serious only about one year in three. This pest has been almost eliminated in some localities by persistent collection of the fallen fruit and by turning sheep and pigs, both of which devour the fallen fruit greedily, into the orchards. The pest has recently become of sufficient importance to necessitate the formation of syndicates for its suppression. Some growers have tried the effect of hanging bait-traps in the trees, and the Lotrionte and Berlese methods are beginning to be used. The parasite, *Opius concolor*, occurs in some localities.

Of the Coleopterous pests that are found in Algeria, *Phloeotribus scarabaeoides* (*oleae*) is more injurious than is generally supposed, especially in neglected plantations ; it has been checked where too abundant by injections of 10 per cent. guaiacol oil. Several species of *Otiorrhynchus* (*O. cribricollis*, *O. meridionalis*, *O. raucus*, etc.) bite through the peduncle of the young fruits in the night. Hand collection reduces the numbers very much, and arsenical sprays ($1\frac{1}{5}$ lb. sodium arsenate per 100 gals.) have also given satisfaction. *Mylabris oleae* is a minor pest, found chiefly in Oran.

MALENOTTI (E.). **La Cecidomyia del grano e le grandinate.** [The Wheat Cecidomyiid and Hailstorms.]—*Giornale di Agric. della Domenica*, xxxiv, no. 12, p. 107, 1 fig. Piacenza, 23rd March 1924.

Wheat in the provinces of Verona and Brescia has been severely attacked by *Mayetiola destructor*, Say. One point noted was that attack immediately caused the plant to put forth another stem so that the infested plants had one withered stem harbouring the puparia of the fly, and a second healthy one. Much of the increase in infestation is attributed to a severe hail-storm in June 1922. If such a storm occurs when the ears are mature, the many seeds beaten to the ground produce young plants in summer at a time when such an abundant food-supply must greatly favour the pest.

STELLWAAG (F.). **Die Grundlagen für den Anbau reblauswiderstandsfähiger Unterlagsreben zur Immunisierung verseuchter Gebiete.** [The Basis for the Cultivation of Stocks resistant to *Phylloxera* for the Immunisation of infested Districts.]—*Monogr. angew. Ent.*, no. 7, 88 pp. Beiheft to *Zeitschr. angew. Ent.*, x. Berlin, Paul Parey, 1924. Price 5 Gold Marks.

Up to 1923, German legislation respecting *Phylloxera* limited the infestation to 1·5 per cent. of the total vine-growing area. As infested areas abut upon the chief viticultural districts everywhere, the breakdown of eradicative measures consequent on post-war financial conditions renders resort to grafting on resistant stocks imperative. These investigations, made in 1922 and 1923, bear on the position that German viticulture must take regarding the use of immune stocks. They deal with the visible effect of punctures by *Phylloxera* as a sign of immunity; the behaviour of vines under natural or artificial conditions towards Thuringian *Phylloxera*; the behaviour of Naumburg (Thuringia) vines towards *Phylloxera* in other districts; and the behaviour of grafted vines in a centre of infestation in the Palatinate.

The following are among the results obtained: Nodosities require 4 weeks for development. *Phylloxera* perishes on the roots of immune vines owing to a reaction of the cells around the puncture. In the case of some vines liability to root-infestation can be indirectly ascertained by observing the leaf-reaction to the punctures. Galls develop on the leaves of vines with susceptible roots. Fertile galls develop in 10-14 days. *Phylloxera* starves on the leaves of other vines. Variation in susceptibility of a given kind of vine is due to different types of *Phylloxera* and not to changes in immunity. *Phylloxera* from the Rheingau, Hessen and Palatinate are all of the same biological nature, and they differ from those from Thuringia. For this reason the above results with *Phylloxera* from Naumburg (Thuringia) are not always applicable, but may need supplementary observations.

GRASSI (B.) & TOPI (M.). **Sperimenti sulle presunte diverse razze o specie di filossera della vite.** [Experiments on the supposed various Races or Species of *Phylloxera* of the Grape-Vine.]—*Atti R. Accad. Naz. Lincei*, Rendiconti Classe sci. fis. mat. e nat., xxxiii, no. 2, pp. 47–52. Rome, 20th January 1924.

In 1917 the authors described experiments with *Phylloxera* in which for three consecutive years leaf-galls from Clinton vines [a hybrid of *Vitis labrusca*] failed to infect either the leaves or the roots of American vines [*R.A.E.*, A, vi, 56]. They discontinued the work in 1920, but resumed it in 1922 and 1923. Börner has recently come to the conclusion that there are two species of *Phylloxera* of the vine, *P. vastatrix*, Planch. (northern form) and *P. vitifolii*, Fitch (southern form) [*R.A.E.*, A, xi, 433]. In this paper the authors describe a number of experiments, including some with material obtained from Börner, with results absolutely contradictory to this conclusion. [See next paper.]

GRASSI (B.) & TOPI (M.). **Le due specie di filossera della vite, distinte dal Börner, sono inconsistenti.** [The two Species of Vine *Phylloxera*, as distinguished by Börner, are inconsistent.]—*Atti R. Accad. Naz. Lincei*, Rendiconti Classe sci. fis. mat. e nat., xxxiii, no. 3, pp. 81–84, 4 figs. Rome, 3rd February 1924.

The experiments referred to above lead the authors to the following conclusions :—

It is easy to infect Italian vines (grown in pots or in the field) by means of infected leaf-galls or roots of any origin. Root-infection of American vines (even if the varieties are resistant from a practical point of view only) is very difficult. Leaf-gall infection is less difficult provided that suitable material is used in abundance for producing the infection.

The gall infection manifests itself in various ways from the north of Italy (damp climate of Novara) to the centre (Tuscany) and to the south (Sicily), but the root form of all regions can infect and produce nodosities even in the most resistant vines such as Riparia Gloire and 3309. There is nothing to warrant the belief that in certain conditions the gall form does not behave in a uniform manner towards given vines, irrespective of the place of origin of the *Phylloxera* (excepting in the case of direct gallicolae, as will be shown).

The " German " [northern] *Phylloxera* of Börner died out naturally—in the gall form—on Italian vines, showing that the latter (or at least the plant used) were unsuitable ; it did produce nodosities on 3309, thus behaving in a manner either not different or only slightly different from that of the *Phylloxera* of Italy.

Börner obtained the gall form *direct, i.e.*, by artificially transforming the root forms into gallicolae without their passing through the winter-egg. All his observations are based on such gallicolae. The authors point out that in 1908, when using the Clinton vine (a hybrid *Vitis labrusca*) they obtained the direct transformation of root-forms into gallicolae, and that such direct gallicolae and their descendants of the same year did not produce galls on 3309 and 3306. This, therefore, is not a characteristic of the " German " *Phylloxera*, but simply that of direct gallicolae. All that Börner has done is to observe that this peculiarity remains in further generations, and in extending these observations to Italian vines, American vines, and hybrids.

The supposed differences in morphology in the supposed two species of *Phylloxera* were investigated by comparing root-forms from 3309 (therefore undoubtedly " southern " *Phylloxera*) with those from Arizzano and also with those obtained from " German " neogallicolae. No differences were observed.

The conclusion is that neither the morphological differences adduced by Börner nor the differences in behaviour of various American vines as regards susceptibility justify acceptance of two distinct species of *Phylloxera*.

FOÀ (A.). **Sul ciclo morfologico e biologico del** *Nosema bombycis* **Nägeli.** [On the Morphological and Biological Cycles of *N. bombycis*.]—*Atti R. Accad. Naz. Lincei*, Rendiconti Classe sci. fis. mat. e nat., xxxiii, no. 3, pp. 97–100. Rome, 3rd February 1924.

The title of this paper indicates its contents. It is a summary of a three years' study of the causal agent of pebrine in the silkworm.

JANISCH (E.). **Das Problem der Giftwirkung in der Pflanzenschutzforschung. Ein Beitrag zur angewandten Zellenlehre.** [The Problem of the Action of Poison in Plant Protection Research. A Contribution to Applied Cytology.]—*Centralbl. Bakt. Paras. & Infekt.*, IIte Abt. lxi, no. 1–4, pp. 10–32. Jena, 1st March 1924.

This is a survey of the question of the action of poisons on the cells of the organism concerned, particularly in relation to insect pests, and of the reactions of the various kinds of cells to them. The author briefly reviews previous work bearing on the subject and outlines the points to be considered in any future study of it.

JANISCH (E.). **Ueber Alterserscheinungen bei Insekten und ihre bekämpfungsphysiologische Bedeutung.** [The Morphological Appearances of Age in Insects and their Importance as regards Control from a physiological Standpoint.]—*Die Naturwissenschaften*, 1923, no. 47, pp. 929–931, 1 fig. Berlin, 1923.

In the course of a recent study of measures against *Sitodrepa panicea* [*R.A.E.*, A, xii, 42] information was obtained on the morphological appearance of this beetle at various ages which has a practical value. Work from the toxicological point of view [*cf.* preceding paper] has indicated a close relation between age and mortality in insects. This may explain many discrepancies noted by different workers, and in future it will be necessary in describing experiments in control to record the age and condition of the insects. For instance, it has been stated that *Calandra granaria* can survive the coldest winter in the open air, whereas it has also been contended that this weevil dies at –5° C. [23° F.]. It is probable that the individuals in question were of different ages and thus varied in their powers of resistance.

As regards the appearance of *S. panicea* at various ages it is necessary to bear in mind that the adult beetle does not eat, but lives on the reserves of nourishment acquired in the pupal stage. In young adults the abdomen projects beyond the elytra, the tergites being almost entirely visible. With age the abdomen shrinks until the wings cover the upturned lateral edges. A table is given showing the gradual progress of this reduction at ages varying from 14 to 30 days. The pupal case is abandoned and mating occurs when the beetle is 10–14 days old, the total life occupying 6–8 weeks. About 3 weeks after emergence, which usually coincides with mating, oviposition ends. According to Dr. Voelkel, from this age onwards the consumption of oxygen increases, while there is a decrease of the amount of carbon dioxide produced. There is, therefore, a marked internal change in *S. panicea* when about 30 days old, and this is plainly apparent in the external condition. At this stage the abdomen is completely covered, the fat body is entirely reduced and oviposition has ended. From the practical point of view this means that measures against beetles that no longer infest the food-stuff are useless.

It is probable that similar conditions obtain with *Trogoderma granarium*, *Niptus hololeucus*, *Anthrenus*, and *Lasioderma serricorne*.

SORDINAS (J.). **La lutte contre la mouche de l'olive à Corfou.**—*Redia*, xv, no. 1–2, pp. 97–103. Florence, 25th February 1924.

The successful campaign against the olive fly, *Dacus oleae*, in Greece [*R.A.E.*, A, x, 3] led to the same measures—spraying with a modified De Cillis formula containing 900 parts (by weight) of water to 100 of treacle and 3 of sodium arsenite—being adopted in 1921 in Corfu, where there are 4 million olive trees. Four applications were made on the olive trees throughout the island at the end of June, July, and August, and from mid-September to early October, with another

in the low-lying districts, especially on the coast, where the flies of the 3rd generation may do great damage and even destroy the entire crop. For the first application about 9 oz. (by weight) of solution was used per tree, and from 12 oz. to 1 lb. for the subsequent ones according to the size of the tree. The jets were directed to the interior of the tree because the fly oviposits under shelter of the outer leaves. One man can spray 800 trees in a day. The author states that the results surpassed the most optimistic expectations, the entire crop being preserved, and that incidentally these measures destroyed common flies, wasps, *Lasioptera berlesiana* (another Dipterous pest of olives) and mosquitos, the absence of which led to the total absence of malaria in 1921, while bees did not touch molasses containing sodium arsenite. In certain neighbouring small islands that were not treated or incompletely so between 20 and 100 per cent. of the olive crop was lost.

This method seems to eradicate *D. oleae*, and the financial gain to olive growers is very great. No definite data were obtained as to its effect on the parasites of *D. oleae*.

Pfankuch (K.). **Die Typen der Gravenhorst'schen Gattungen** *Phytodietus* **und** *Ischnocerus* **(Hym.).** [The Types of Gravenhorst's Genera *Phytodietus* and *Ischnocerus*.]—*Konowia*, iii, pt. 1, pp. 41–51. Vienna, 20th March 1924.

The synonymy of these Icheumonids is discussed.

Dubosco (O.) & Grassé (P.). **Notes sur les Protistes parasites des Termites de France. I.** *Trichomonas trypanoïdes* **n. sp.**—*C. R. Soc. Biol.*, xc, no. 8, pp. 547–550, 5 figs. Paris, 7th March 1924.

Trichomonas trypanoïdes, sp. n., is described from *Reticulitermes lucifugus* from Bordeaux.

Dufrénoy (J.). **La lutte contre les maladies des plantes par la désinfection des semences.**—*Rev. Bot. app. & Agric. colon.*, iv, no. 30, pp. 81–87. Paris, 29th February 1924.

A general account is given of the disinfection of seeds and bulbs both by heat and chemical means so as to protect them from insect pests.

Cappe de Baillon (P.). **Mycose des centres nerveux chez le Grillon domestique** (*Gryllus domesticus*, **L.**).—*Ann. Parasit. hum. & comp.*, ii, no. 1, pp. 26–33, 2 figs. Paris, January 1924.

A case is recorded of the invasion by a fungus of the cerebral ganglia of the common cricket, *Gryllus domesticus*, L., resulting in difficulty in movement and paralysis of the mouth-parts. The infection was proved to have been effected by means of the digestive tract.

Pečirka (J.). **Vzácní kovaříci. (De Elateiridis raris).**—*Časopis Československ. společ. ent.*, xx, pt. 4, pp. 77–81. Prague, 28th December 1923. (With a Summary in German.)

The probable symbiotic relations between Elaterids and other beetles is discussed and attention is drawn to the association of *Athous*

rufus, DeG., with *Chalcophora mariana*; *A. mutillatus*, Rosenh., with *Rhamnusium bicolor* in horsechestnut; *A. villosus*, Geof., with *Dicerca berolinensis* in the trunk of beech; and the larvae of *A. villosus* in hollow stems with larvae of *Leptura* spp.

Baudys (E.). **Fauna Čechosloveniae. I. Zoocecidia. Zoocecidie nové pro Čechy. iv.** [Gall-forming Insects new to Czecho-Slovakia.]—*Časopis Ceskoslov. společ. ent.*, xx, pt. 4, pp. 90–105, 5 figs. Prague, 28th December 1923.

This is the final instalment of a paper previously noticed [*R.A.E.*, A, xii, 24].

Farsky (O.). **Bourovec prsténčivý** (*Malacosoma neustria*).—*Ochrana Rostlin*, iv, no. 1, pp. 6–8, 2 figs. Prague, March 1924.

A brief account is given of the life-history of *Malacosoma neustria* as a pest of fruit and other trees in Czecho-Slovakia. The usual remedial measures, such as the destruction of egg-masses and nests, and the collection of adults with lamps, are recommended. The young larvae, while still in the nest, may be treated with an extract of hellebore.

Zimmermann (F.). **Dvě choroby skleníkových karafiátu.** [Two Diseases of Glasshouse Carnations.]—*Ochrana Rostlin*, iv, no. 1, pp. 8–10, 3 figs. Prague, March 1924.

Besides fungus diseases, carnations in glasshouses are attacked by the larvae of *Hylemyia cardui*. This fly is most injurious to young seedlings and may be identified by the presence of the larvae or even pupae in the shoot.

Blattný (C.). **Škůdcové a některé choroby rostlin léčivých v roce 1923.** [Injury and some Diseases of medicinal Plants in 1923.]—*Ochrana Rostlin*, iv, no. 1, pp. 10–12. Prague, March 1924.

Brief notes are given on the pests recorded as injurious to medicinal plants during 1923 in Czecho-Slovakia, which include *Thrips tabaci*, Lind., on *Atropa belladonna*; *Chlorita flavescens*, F., *Anuraphis* (*Brachycaudus*) *cardui*, L., and *Tetranychus* sp. on *Verbascum*; *Myzus* (*Myzoides*) *persicae*, Sulz., on *Hyoscyamus niger*; *Chlorita flavescens*, on *Hyssopus officinalis*; *Eupterix carpini*, Fourcr., and *Epitetranychus* (*Tetranychus*) *althaeae*, Hanst., on *Althaea officinalis*; *Sminthurus luteus*, Lubb., and *Chlorita solani*, Curt., on *Pimpinella anisum*; *Chlorita flavescens*, on *Mentha crispa*; *Syrphus* sp., *Trombidium* sp., *Sminthurus pruinosus*, Tullb., *Chlorita* sp., *Eupteryx carpini*, and *Epitetranychus* (*Tetranychus*) *ludeni*, Zach., on *Petasites officinalis*; *Macrosiphoniella* (*Macrosiphum*) *tanacetaria*, Kalt., and *Lygus campestris*, F., on *Tanacetum vulgare*; *Eriophyes salviae*, Nal., and *Epitetranychus ludeni*, on *Salvia* sp.; *Lygus* sp., *Cassida* sp., and *Eupteryx carpini*, on *Melissa officinalis*; *Macrosiphum tanaceti*, Kalt., *Thrips tabaci*, *Sminthurus solani*, Curt., *Aphis rumicis*, L., *Chlorita flavescens*, and *Tetraneura* sp., on *Digitalis purpurea*; and *Sminthurus solani*, on *Datura stramonium*.

MURPHY (P. A.) & MCKAY (R.). **Investigations of the Leaf-roll and Mosaic Diseases of the Potato.**—*Jl. Dept. Agric. & Tech. Instr. Ireland*, xxiii, no. 4, pp. 344–364, 10 figs. Dublin, February 1924.

Investigation of the leaf-roll and mosaic diseases of potato was continued in 1923 [*R.A.E.*, A, xi, 92, 392, 579]. The weather conditions in the preceding year, which largely influenced the abundance of Aphids, are discussed. The common green Aphids were very scarce. A few colonies of *Aphis rumicis* were found on potatoes, and Coccinellids were common about mid-June. In July, the Capsid, *Calocoris bipunctatus*, appeared and remained very abundant. Jassids were absent, and the flea-beetle, *Psylliodes affinis*, was not very prevalent. It has not yet been definitely determined which are the principal disseminating agents of the diseases, but it is difficult, in view of the observations of 1922, to believe that Aphids are the sole carriers. In later experiments, Aphids (*Macrosiphum solanifolii*) were used in an attempt to convey infection from the sprouts of one variety of potato to those of other varieties. Evidence points to this having been achieved in a number of cases, but a second generation of plants must be grown before a detailed report can be presented.

M[ASON] (F. A.). **Brewery Flies.**—*Bull. Bur. Bio.-Technol.*, ii, no. 11–12, pp. 87–90, 3 figs. Leeds, October-December 1923. [Received 21st March 1924.]

The possibility of the transmission of infective fermentation organisms by flies is pointed out. The species concerned are *Musca domestica* (common house-fly), *Fannia scalaris* (latrine fly), *Stomoxys calcitrans* (stable fly), *Drosophila funebris*, *D. fenestrarum* and *D. melanogaster*. As the last three are less well known a brief general account is given of their life-history and habits. They subsist chiefly on saccharine matter as represented by ripe and decaying fruit, beer-wort, vinegar-wort and vinegar wine-must, brewers' grains and many other vegetable substances, and may also breed in animal excreta and other refuse. A large number of pupae were found on the inside surface of the head of a discarded cask. The importance of destroying any possible breeding grounds of these flies is pointed out, and the use of baits consisting of poisoned wort is recommended.

P[ARKER] (T.) & (A. W. L.) **Comparison of Three Commercial Brands of Arsenate of Lead.**—*Bull. Bur. Bio-Technol.*, ii, no. 11–12, pp. 97–104, 3 figs. Leeds, October-December 1923.

Dry lead arsenate has been used very little in Great Britain, the apparent prejudice against the employment of this material for dusting being justified to a large extent by the facts that, in comparison with conditions in the United States and Canada, the areas to be treated are so much smaller that greater care must be exercised in keeping the dust within the confined limits, and that there is, further, the risk of contaminating ground crops where these are grown between fruit trees in plantations or grass in orchards. There is also the question of endangering the health of persons living in close proximity to the fruit areas.

In the case of lead arsenate for dusting it is important that its fineness should be such as to enable the dust to adhere, and that the

density of the particles should be sufficiently low to enable a dust fog to remain as such when delivered from a suitable distributing machine. The important points in a powder arsenate to be used in water suspension are fineness in sub-division and lightness in density of particles, good spreading power when applied to foliage, and ability to mix readily with water and remain in suspension for at least half an hour without settling. There is by no means uniformity in physical characters among the various commercial brands of arsenate. The observations of previous workers along these lines are reviewed [*R.A.E.*, A, xi, 393, 522, 551]. Pinckney's observation that soap dissolves the arsenic from the acid and neutral lead arsenate, and may cause injury to foliage is confirmed, the action being much more pronounced if the soap contains free alkali. The stearate soaps appear to have a greater dissolving action than the oleate soaps, particularly in the case of the acid lead arsenate. The use of soap with lead arsenate is therefore not recommended, in spite of the general practice among growers of using nicotine soap and lead arsenate spray in the early spring.

In determining the insecticidal value of lead arsenates it appears to be important to study the chemical and physical properties together with their actual killing properties on living insects. Their chemical properties do not indicate their insecticidal value apart from the actual arsenic content.

P[ARKER] (T.). **The Use of Emulsified Oils as Ovicides.**—*Bull. Bur. Bio-Technol.*, ii, no. 11–12, pp. 105–107. Leeds, October-December 1923.

Recent work in connection with the use of emulsified oils for the destruction of insect eggs is reviewed. The assumption that at a strength to be effective against the eggs they must have an injurious effect upon the growing tree even when applied in the dormant period is proved to be somewhat erroneous in the light of these results. To be efficient as egg destroyers, however, the oils must be of a definite specification, those obtained from a distillation of tar apparently being most effective. The action of the emulsion seems to indicate a gradual disintegration of the chitinous covering with absorption of the oils, thus causing a coagulation of the embryonic protoplasm.

Lime-sulphur solution, although caustic in action, only appears to leave a finely-divided film deposit of sulphur, which is not likely to disintegrate the chitinous covering of which the outer shell of the egg is composed. With caustic soda, the final deposit after exposure to air will be sodium carbonate, which is readily soluble in water, so that causticity will rapidly disappear.

P[ARKER] (T.) & A. W. L. **A Further Note on the Carnivorous Habits of** *Tachycines asynamorus*.—*Bull. Bur. Bio-Technol.*, ii, no. 11–12, pp. 108–109. Leeds, October-December 1923.

The observations here described are further proof of the cannibal habits of *Tachycines asynamorus* [*R.A.E.*, A, xi, 178]. This Orthopteron apparently develops these habits in captivity, whereas if given free access to greenhouses or a commercial nursery it is a vegetable feeder, and in certain nurseries is still causing injury. A successful method of keeping down its numbers is to hunt it by night with lanterns.

Passerini (N.). **Sopra l'azione della polvere di** *Pyrethrum cinerariaefolium* **Trev. sugli insetti e su qualche altro artropode.** [The Action of Powder of *P. cinerariaefolium* on Insects and on some other Arthropods.]—*Nuovo Giorn. Bot. Ital.*, xxxi, no. 1, pp.36–49. Florence, 25th February 1924.

The results are given of experiments as to the effect of pyrethrum powder on various insects, etc. It is certainly efficacious against flies and mosquitos, fleas, bed-bugs, mites on fowls, *Bruchus* spp., *Haltica* spp., cockroaches, wasps, ants and Aphids, but has no effect on the more common species of *Cetonia*, meal worms [*Tenebrio*], the larvae of *Porthetria* (*Ocneria*) *dispar*, locusts, *Eriosoma lanigerum*, *Trombidium* spp., etc. Its action is uncertain on the larvæ of *Anobium* or of *Pieris rapae*.

Juillet (A.). **Sur le Pyrèthre Insecticide.**—*C.R. Acad. Agric. France*, x, no. 10, pp. 357–359. Paris, 1924.

The information contained in this paper has been noticed from another source [*R.A.E.*, A, xii, 194].

Vivet (E.), Delassus (—) & Fabre (J. H.). **La Lutte contre l'Eudémis en Algérie.**—*Rev. agric. Afr. Nord*, xxii, no. 241, pp. 161–176, 1 pl. Algiers, 14th March 1924.

In consequence of heavy losses in the Algerian vineyards due to the vine-moth [*Polychrosis botrana*, Schiff.] the authors have published this series of three papers in order to bring before the notice of growers the best methods of dealing with the pest. In the first paper the distribution of the moth in Algeria is explained, and an account is given of the biology and damage caused by the larvae, with a description of cultural and mechanical remedial measures.

The second paper discusses the treatments to be given, particularly in spring, the arsenical preferred for Algeria being sodium arsenate. The value of a mixed spray containing copper sulphate as well as arsenicals is pointed out, but this is seldom used in Algeria. The preparation of the most usual formulae is explained. The spring treatments should begin as soon as the moths begin to fly, 2 or 3 applications being made before the flowering of the vine, and should be followed by sprays of copper sulphate and nicotine or of pyrethrum-soap solution directed against the eggs and larvae of the 2nd and 3rd generations. Co-operation in these measures is essential, and it is hoped that a widespread Defence Syndicate will be organised at least in time for the 1925 season.

In the third paper the use of the various arsenical salts in agriculture is discussed.

Vayssière (P.). **Trois nouveaux Coccides de l'Afrique française (Hem.).**—*Bull. Soc. ent. France*, 1924, no. 2, pp. 28–32, 3 figs. Paris, 1924.

Orthezia arenariae, sp. n., is described from Morocco on *Arenaria pungens*; *Monophlebus suaedae*, sp. n., from Tunisia on *Suaeda pruinosa*; and *Aspidoproctus mimeuri*, sp. n., from Senegal on *Tamarindus indica*.

HALL (W. J.). **Further Observations on the Coccidae of Egypt.**—*Minist. Agric. Egypt*, Tech. & Sci. Serv. Bull. 36, 67 pp. 13 pls. Cairo, 1923.

Among the species dealt with in the first part of this paper the following are described as new: *Halimococcus thebaicae* on *Hyphaene thebaica*, *Pseudococcus trispinosus* on *Imperata cylindrica*, *Ripersia cellulosa* on *I. cylindrica* and *Saccharum biflorum*, *R. imperatae* on *I. cylindrica*, *R. internodii* on *Saccharum officinarum* (sugar-cane), *R. phragmitis* on *Phragmites communis*, *Trionymus crini* on *Crinum* and *Narcissus*, *T. indecisus* on *I. cylindrica*, *Ceronema acaciae* on *Acacia arabica* var. *nilotica*, *Pulvinaria chrysanthemi* on *Chrysanthemum coronarium*, *P. discoidalis* on an unknown desert plant, *P. retamae* on *Retama raetam*, *Aspidiotus hederae*, Vall. var. *urenae*, n., on *Urena lobata*, *Chionaspis graminis*, Green, var. *aegyptiaca*, n., on *Agrostis verticillata*, *Arundo donax*, and *Imperata cylindrica*, *Coccomytilus isis* and *Lepidosaphes bicuspis* on *Tamarix*, *L. sacchari* on *Saccharum officinarum*, *Osiraspis* (gen. n.) *balteata* on *Tamarix*, *Pinnaspis zillae* on *Zilla spinosa*, and *Targionia longiloba* on *Tamarix*.

The second part contains further notes on the Coccids previously recorded [*R.A.E.*, A, x, 494], and the last part remarks on certain species recorded by other workers but not yet represented in the collection of the Ministry of Agriculture. A list is also given of the new records of COCCIDAE arranged according to plant genera.

GREEN (E. E.). **On a new Species of *Coccomytilus* from Egypt.**—*Minist. Agric. Egypt*, Tech. & Sci. Serv. Bull. 36, p. 63, 1 pl. Cairo, 1923.

Lepidosaphes (*Coccomytilus*) *halli*, sp. n., is described from *Prunus* sp. in Cairo.

BISHARA (I.). **A Preliminary Note on the Estimation of Loss by Bollworms.**—*Minist. Agric. Egypt*, Tech. & Sci. Service, Bull. 39, 22 pp., 6 figs. Cairo, 1924.

Various experiments have been undertaken in Egypt of recent years with a view to determining the loss in quantity of cotton due to the attacks of the bollworms, *Platyedra* (*Pectinophora*) *gossypiella* and *Earias insulana* [*cf. R.A.E.*, A, xi, 96]. The basis of the present estimation was an examination of open bolls, which were collected daily, and sorted into sound and attacked bolls, each lot being weighed separately. The difference in weight of the lots is taken to be the loss due to bollworms. The various methods used by the Entomological Section are described, and their disadvantages discussed. All the methods involve examination of large numbers of ripe bolls that have to be wrapped each separately in a piece of paper as soon as they are picked, and the labour entailed in securing an accurate estimation is so great that it could only be employed for a few localities each season. It is hoped that there may be some easier and not less accurate method of estimating the loss, such as examination of seeds instead of bolls, or, as is being tried in America, the relation between the loss and the weight of a fixed volume of seed.

The results of the experiments are shown in a series of tables. It was observed that bolls begin to be attacked on the 4th or 5th day

after flowering, and at the end of the season even the smaller bolls may be harbouring larvae. A graph demonstrates the relation between the percentage of damaged bolls, the percentage of loss in seed cotton and the percentage of damage of seed as regards weight and number. These three relations form more or less smooth curves, rising slowly at first and then more rapidly. Within the limits of the experiment there seems to be a definite percentage of loss in lint and seeds corresponding to each percentage of attack in the open bolls. The two curves of loss and seed damage by number of seeds seem nearly to coincide up to about 70 per cent. of open boll attack. Above this they diverge, the loss of seed cotton becoming much greater. Another graph shows the relation between the proportion of open bolls attacked by bollworm and the amounts of cotton sound, damaged and lost. Thus, when 75 per cent. of open bolls was entirely free from bollworms, 75 per cent. of the crop was sound cotton from sound bolls ; a further 11½ per cent. was sound cotton from damaged bolls, 10 per cent. slightly damaged cotton, 1½ per cent. badly damaged and 2 per cent. lost. Further trials will be made next season to test this theory for other years and other places. It was observed that damaged bolls appeared to ripen more rapidly than sound ones.

Sampson (F. W.). **Platypodidae of the Belgian Congo.**—*Rev. zool. Afr.*, xii, pt. 1, pp. 123–133. Brussels, 1st March 1924.

The Scolytids recorded from the Belgian Congo include the following new species : *Crossotarsus schoutedeni ; C. excavatus ; C. interruptus ; C. crinitus*, Chapuis, var. *dubius*, n. ; *C. vegrandis ; C. rapax*, also from Southern Rhodesia ; *C. marshalli*, also from South Africa ; *Platypus fecundus ;* and *P. mordax*, also from the Gold Coast.

Miller (D.). **The Gum-tree Scale and its Control.**—*N. Z. Jl. Agric.*, xxviii, no. 1, pp. 1–5, 6 figs. Wellington, N.Z., 21st January 1924.

Eriococcus coriaceus, Mask. (gum-tree scale) attacks practically all species of *Eucalyptus*, though the blue-gum (*E. globulus*) is preferred. In cases of severe attack, the drain on the sap is so heavy that the tree rapidly wilts and eventually dies, the presence of large quantities of honeydew contributing to the unhealthiness of the tree. The sacs enclosing the female scales are stationary on the underside of the bark, where the males also are found in a more loosely woven sac. The males pass through a resting stage and early in the course of development grow a pair of wings. There are two generations at least, one in spring and one in autumn, more probably occurring during the summer months. Great numbers of young larvae crawl from under the parent sac, forming a fine, reddish dust on the trees, and in this stage the insect may be carried long distances by wind, and sometimes by birds or by other insects. The larvae usually congregate along the mid-rib of the leaves, which the females soon leave for the twigs and younger branches, the males crawling beneath the dead bark. When this Coccid became established in the South Island, the Coccinellid, *Rhizobius ventralis*, Erichs., was imported from Australia and rapidly succeeded in bringing it under control, so that when it appeared in the North Island, Coccinellids were sent over from the South Island and are now well established. Both adults and larvae are predacious

on the scale; the adults can fly for considerable distances; the pupae occur under dead bark of *Eucalyptus*, attached to the trunk. The Coccid is also destroyed by certain birds. In order to make control of the scale still more certain, some Chalcid parasites, and a moth, the larvae of which are predacious on it, are being secured from Australia.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxi, pt. 1, pp. 16–17. Brisbane, January 1924.

Against *Mastotermes darwiniensis*, Frogg., paradichlorobenzene is considered more effective than carbon bisulphide; the fumes last at least four weeks and thus have time to impregnate the ground and penetrate into any unsealed holes in the sets or underground portions of the sugar-cane. The injections should be placed a foot apart on each side of a row of cane stools, about 6 inches from the centre of the stools and at a depth just above the level of the sets.

A report has been received from one locality that arsenic mixed with treacle and sprinkled around the nests of the termites proved very effective; this treatment should be tried where the infestation is confined to small areas, and it might easily be applied in various media. Judging from these results, recent poison bait experiments [*R.A.E.*, A, xi, 511] should prove effective under field conditions also.

GIBSON (A. P.). **Sugar: Field Reports.**—*Queensland Agric. Jl.*, xxi, pt. 1, pp. 17–18. Brisbane, January 1924.

One of the principal pests of sugar-cane in the southern districts is *Pentodon australis*, which is most numerous on land that has carried paspalum grass. It gnaws into the tender hearts of new shoots under ground. This beetle appears to be spreading rapidly, so that widespread injury may be expected unless it is controlled.

JARVIS (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl.*, xxi, pt. 1, pp. 22–24. Brisbane, January 1924.

The seasonal emergence records of *Dacus ferrugineus* are discussed. *Cydia* (*Carpocapsa*) *pomonella* has been very abundant in the Granite Belt apple orchards, and the importance of spraying at the right time is pointed out. A Tortricid as yet unidentified has been causing considerable damage to grape vines; both this pest and Chrysomelids occurring on vines and apples may be controlled by spraying with 1½ lb. lead arsenate paste to 50 gals. water. Two larvae of *Orthorrhinus cylindrirostris* have been found in grape vine canes, but this weevil is not considered of economic importance.

GIRAULT (A. A.). **The Orange-tree Bug** (*Oncoscelis sulciventris* **Stål.**) **Recent Investigations.**—*Queensland Agric. Jl.*, xxi, pt. 1, pp. 57–78, 4 pls. Brisbane, January 1924.

A detailed account is given of the distribution, life-history and habits of *Oncoscelis sulciventris*, Stål (orange-tree bug), being a summary of previous literature [*R.A.E.*, A, xi, 278, 533, 572; xii, 35] as well as of the author's personal observations.

Holdaway (F. G.). **Recent Observations on Insects injurious to Cotton.**—*Queensland Agric. Jl.*, xxi, pt. 1, pp. 79–80, 3 figs. Brisbane, January, 1924.

This is a preliminary report on two Lepidoptera that recently caused considerable damage to cotton seedlings in the Rockhampton district by attacking the foliage, the various stages being described. The more abundant of the two is apparently a species of *Agrotis*, the other having been identified as another Noctuid, *Neocleptria punctifera*, Wlk.

Quarantine Proclamation, no. 115. *Commonwealth Australia Gaz.*, no. 5, 1 p. Melbourne, 24th January 1924.

The pink boll worm, *Platyedra gossypiella*, is declared to be a pest affecting plants.

Quarantine Proclamation, no. 116. *Commonwealth Australia Gaz.*, no. 5, 1 p. Melbourne, 24th January 1924.

Cotton seed may only be imported into Australia at Brisbane and by permission of the Minister of Agriculture. It must be disinfected on arrival and remain in quarantine after being planted until officially released. Raw cotton may only be landed at Sydney, and before being released from quarantine must be disinfected. This is a modification of the conditions of Quarantine Proclamation no. 38, which is repealed.

Muir (F.). **Entomology.**—*Rept. Comm. Expt. Sta. Hawaiian Sugar Planters' Assoc. 1922–23*, pp. 10–18. Honolulu [1924.]

Perkinsiella saccharicida (sugar-cane leafhopper) was very scarce during 1923, largely owing to the activities of the egg-sucking bug, *Cyrtorhinus mundulus*, which was imported from Australia and has become established in Hawaii and the surrounding islands. The parasite *Paranagrus* is decreasing owing to the diminished numbers of leafhoppers, and it remains to be seen whether *C. mundulus* will be a sufficient check on the leafhopper in those areas where the parasite has practically died out. The introduction of the Tachinid, *Ceromasia sphenophori*, has led to a great reduction in the numbers of *Rhabdocnemis obscura*, but where this Tachinid does not yet occur, the weevils still do great damage to sugar-cane ; the loss due to them for the past 5 years is estimated at approximately £18,450. Where infestation is severe, early harvesting and burning off should be practised, but further parasitic control would be more satisfactory. A Tachinid that parasitises a similar borer (*Sphenophorus incurrens*) in Mexico has been introduced. *Anomala orientalis*, although it has not been exterminated by its Scoliid parasite [*Scolia manilae*], is kept in complete economic control by it ; *Adoretus* [*sinicus*] is also checked in cultivated areas by this parasite, but is still a serious pest in grass lands and garden lawns. Armyworms were very numerous in some localities and considerably damaged young sugar-cane. A mixture of 1 part Paris green and 8 parts finely-powdered air-slaked lime dusted over the leaves was found effective. If the insects could be controlled in the grasslands where they breed, before their migration to cane fields, the trouble would be greatly reduced. Several parasites have

been found in Mexico ; one of these, *Euplectrus* sp., has been bred in large numbers, and about 23,000 have been liberated. Experiments are also being made with a large Carabid beetle from California, and as the mynah bird is valuable in keeping the pest down, it is suggested that a few large trees in which they can nest should be kept in the neighbourhood. Aphids have always been troublesome in cane fields to a certain extent. *Aphis maidis* has been considered of little account on sugar-cane, but since it has been found to carry mosaic disease from maize and the grasses where it breeds, several parasites have been introduced against it, the efficacy of which is not yet known. The discovery and introduction of the parasite, *Pseudaphycus utilis*, has reduced to negligible proportions the numbers of *Pseudococcus nipae* (avocado pear mealybug), which was one of the commonest mealybugs of Honolulu, on avocado pear, banyan and other fig trees, etc.

Monzen (K.). **Morphologische und biologische Untersuchungen über** *Tetraneura moriokaensis*, n. sp. [Morphological and biological Investigations on *T. moriokaensis*, sp. n.]—Separate, 6 pp., 2 pls., from *The Scientific Researches. The Alumni Assoc. of the Morioka Agric. Coll.*, i. Morioka, July 1923. [Also in Japanese.]

A new Aphid, *Tetraneura moriokaensis*, is described and figured. The egg, which is laid in cracks of the bark of *Zelkowa serrata*, hibernates and hatches early in May. The fundatrix produces a pocket-shaped gall on the upper leaf-surface, and her offspring develops into winged individuals, usually by mid-July. These alate viviparous females emerge from lateral apertures on the lower halves of the galls and migrate to *Sasa albomarginata*, on the foliage of which they deposit their young, which suck the roots and develop into an entirely apterous generation. The alate individuals that appear in autumn return to *Z. serrata*, being numerous on the trunks in the second half of October. These sexuparae deposit their larvae in cracks of the bark, and the resultant females lay each a single egg in sheltered situations.

Leefmans (S.). **Over den stand van den import der parasiten van den Koffiebessenboeboek uit Uganda.** [The Position of the Importation from Uganda of Parasites of the Coffee Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 9, pp. 191–201. Soerabaya, January 1924.

From material collected in Uganda by Heer den Doop many individuals have been bred of a parasite believed to be the Bethylid, *Prorops nasuta*, Wtrst. [*R.A.E.*, A, xi, 456]. A Calliceratid, *Calliceras dictynna*, Wtrst., described at the same time from Uganda from *Stephanoderes hampei*, Ferr., is not considered to be a parasite of this Scolytid. The identity of a second parasite found by den Doop, but not yet successfully imported, has not been determined. *P. nasuta* has been bred, but not yet liberated. According to den Doop, if both parasites were imported into Java, *P. nasuta* would be very scarce after the coffee harvest if the practice of clearing up the black berries is continued, as it attacks the beetles in berries that have been infested for some time, whereas the second parasite attacks beetles in newly-infested berries. On the other hand, den Doop has found many individuals of *P. nasuta* in red berries, and as it has often been bred

in Java from red berries from Uganda, it is uncertain whether the two species might not prove detrimental to each other. Heer den Doop also reports that the second parasite has other hosts besides the coffee berry borer, so that it may prove to be only an occasional parasite of it.

The following points were noted by den Doop. *P. nasuta* oviposits on the prepupa and pupa of the beetle. The adult attacks the eggs, larvae and pupae. The adult does not readily leave an infested berry. Reproduction is not much more rapid than that of the beetle, the period of development being about 28 days and the adult living for about 39 days. It does not thrive in the shade. As it chiefly occurs in black berries, it becomes of importance at the end of the coffee harvest.

SCHMIEDEKNECHT (O.). *Heterospilus coffeicola* **n. sp., eine in Kaffeefrüchten in Uganda lebende Schlupfwespe.** [*H. coffeicola*, sp. n., a Hymenopterous Parasite living in Coffee Berries in Uganda.]—*Meded. Koffiebessenboeboek-Fonds*, no. 9, pp. 202–204, 1 fig. Soerabaya, January 1924.

Heterospilus coffeicola, sp. n., is described from coffee-berries from Uganda. The Braconids of this sub-family (HECABOLINAE) are parasites of wood-infesting beetles. The material from Uganda included a Chalcid of the genus *Closterocerus*, which is almost certainly a parasite of this new Braconid.

FRIEDERICHS (K.). **Proeven ter bestrijding van den Koffiebessenboeboek met twee chemische middelen.** [Tests with two Chemicals against the Coffee Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 9, pp. 205–218. Soerabaya, January 1924.

Experiments in spraying and painting coffee-berries with latex containing 12–15 per cent. rubber, either with or without the addition of formalin, have proved that this substance is not suitable for combating the coffee berry borer [*Stephanoderes hampei*], one reason being the prohibitive cost.

Phytophiline, a Dutch proprietary insecticide that appears to contain soap and derris, also proved quite ineffective and far too costly.

GANDRUP (J.). **Proeven over de bruikbaarheid van enkele insecticiden bij de bestrijding van den Bessenboeboek.** [Tests of the Usefulness of some Insecticides against the Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 9, pp. 219–223. Soerabaya, January 1924.

A number of tests with Phytophiline [see preceding abstract] had one valuable result, namely, that of showing that measures against the coffee berry borer must be carried out continuously, even during the months preceding the plucking of the crop. It is dangerous to suspend them even for one month before plucking and clearing up the fallen berries.

GANDRUP (J.). **Eenige gegevens over het onts metten van koffiezaad.** [Some Data on the Disinfection of Coffee Seed.]—*Meded. Koffiebessenboeboek-Fonds,* no. 9, pp. 224–228. Soerabaya, January 1924.

To prevent the spread of the coffee berry borer [*Stephanoderes hampei*] the disinfection of coffee seed with carbon bisulphide has been advised, but in some cases the germination of the seed has been affected. The best conditions are provided by fumigation for two hours with 5 fluid oz. to 35 cu. feet, including the space occupied by the seed to be fumigated. It is absolutely essential that the seed should be quite dry.

ULTÉE (A. J.) & ARISZ (W. H.). **De in 1923 door het Koffiebessenboeboek-Fonds, het Besoekisch Proefstation en het Proefstation Malang verzonden Circulars, welke op den Koffiebessenboeboek betrekking hebben.** [The Circulars on the Coffee Berry Borer sent out in 1923 by the Coffee Berry Borer Fund, the Besoeki and Malang Experiment Stations.]—*Meded. Koffiebessenboeboek-Fonds,* no. 9, pp. 229–237. Soerabaya, January 1924.

Most of the information given in these circulars on the coffee berry borer [*Stephanoderes hampei*] has already been noticed. The principal measure is the removal of all berries left on the bushes after the harvest and of all fallen berries. Where plucking is done at long intervals, such as 30-40 days, a great increase in infestation is entailed.

Nieuwe literatuur betreffende den Koffiebessenboeboek. (Vervolg van het overzicht gegeven in No. 7, pp. 169–171.) [New Literature on the Coffee Berry Borer. A Continuation of the List in No. 7, pp. 169–171.]—*Meded. Koffiebessenboeboek-Fonds,* no. 9, pp. 238–239. Soerabaya, January 1924.

The title is self-explanatory. The previous list has been noticed [*R.A.E.*, A, xi, 355].

LEEFMANS (S.). **De Koffiebessenboeboek. II. Bestrijding.** [The Coffee Berry Borer. II. Control.]—*Meded. Inst. Plantenziekten,* no. 62, 99 pp., 5 charts. Buitenzorg, 1924. (With a summary in English.)

The life-history and ecology of *Stephanoderes hampei,* Ferr., have been dealt with in a previous paper [*R.A.E.*, A, xi, 236]. In this one only general advice is given, based on 3 years' practical work.

The economic importance of *S. hampei* is considerable. Slightly infested beans lose 8 per cent., heavily infested beans 42 per cent. of their weight. For the residency of Kediri alone the loss for 1922 has been estimated at £125,000 at par.

The harvest bags, which should be of a closely woven material, must not be left open, and sorting of the berries must be avoided in the plantation. The beetles and their brood should be killed by dipping the bags into boiling water before bringing them into the factory. In the factory the coffee must be protected. In Deli some

factories have fine gauze over the berry receptacles to prevent the beetles escaping into the factory and from there to the plantations. The escape of the beetles during fermentation is best prevented by fermenting the berries under water, at least 4 days being necessary. Opinions differ as to the effect on the quality of the coffee. No refuse should be allowed to litter the factory. The practice of sun-drying the beans within the berries, which are exposed to sunshine by day and stored in receptacles by night, should be avoided, as the process is slow and the receptacles are very dangerous foci of infestation. Quick artificial drying should be practised. To prevent the dissemination of the beetle in coffee seed, it must be fumigated with not less than 2 fluid oz. of carbon bisulphide per 34 cubic feet for 12 hours, and the fumigated seed must be planted not later than 2 weeks after treatment.

At the end of the harvest, "rampassen" should be practised, all berries bigger than 2–4 millimetres being removed from the bushes, also the black berries thereon. If this measure is impossible or unnecessary, it may suffice to pick only berries that can yield coffee beans of market value. Immediately afterwards the estate must be cleared of the fallen berries; these may be swept into holes, and a tightly-trampled layer of earth 8–12 inches thick will prevent emergence of the beetles. All the year round black berries on the bushes must be removed, as they are quite as dangerous as black fallen berries; infested green berries must be picked regularly in order to prevent a bad infestation at full harvest time. The infested berries are put in a bamboo bucket with 5 per cent. soap or creoline solution to prevent the escape of the females. It is not yet possible to say if smearing such berries with axle grease and kerosene is effective. It may be useful so long as the beetles are not breeding, as the grease often does not reach the brood in the berry. The cost of remedial measures at Bangelan averaged 10 per cent. of the net product. The borer is such a bad pest in Java and Sumatra that it even pays to adopt cultural methods against it. Control is much facilitated in estates with grafts of one variety, as the bushes all flower and bear at the same time. As regards green manures, such plants should be selected as can be pruned near the ground, in order to facilitate clearing the soil of fallen berries.

Hem Singh. **On the Anatomy and Bionomics of the Red Cotton Bug, *Dysdercus cingulatus* (Fabr.).**—*Jl. & Proc. Asiatic Soc. Bengal*, xix, 1923, no. 1, pp. 15–42, 9 pls. Calcutta, February 1924.

In those parts of India where there is no severe winter the red cotton stainer, *Dysdercus cingulatus*, is found throughout the year. In the Punjab it occurs from the end of February to the middle of November or even later. It sucks the juice from the green cotton bolls and, when they open, it attacks the young, oily seeds, making the lint dirty with its yellow excreta. It prefers young pods of *Hibiscus esculentus* to cotton bolls, and this is therefore used as a trap-plant. It also attacks other malvaceous plants that have juicy, succulent and oily seeds, *e.g.*, the silk-cotton tree [*Eriodendron anfractuosum*]. The habits of the nymphs are similar to those of the adults. They feed gregariously and expose themselves freely on their food-plants. *D. cingulatus* can live without food and air for a considerable length of time. Of three individuals of each sex kept in an empty pill box, one male and one female remained alive for 84 hours.

Pillai (N. K.). **Entomology.**—*Rept. Dept. Agric. & Fisheries, Travancore, 1922–23,* p. 8. Trivandrum, 1924.

The pests recorded are in general the same as those dealt with in last year's report [*R.A.E.*, A, xi, 329]. A Micropezid fly, *Calobata* sp. (ginger borer), oviposits at the base of ginger plants, and when this crop is gathered, the larva migrates to wild arrowroot, where it completes its development. The best remedy is the destruction of the alternative food-plant. Burning the leaves of coconuts infested with *Nephantis serinopa,* as suggested in the last report, has proved a very effective measure.

Craighead (F. C.). **North American Cerambycid Larvae. A Classification and the Biology of North American Cerambycid Larvae.**—*Canada Dept. Agric.*, Bull. N.S. no. 27 (Ent. Bull. 23), 238 pp., 44 pls., 8 figs. Ottawa, 1923. Price $ 1.00.

This important bulletin, which deals with some 300 species of Cerambycid larvae, including all that are important forest pests, contains tables, descriptions and figures for their identification in the larval stage, and some information on their food habits and biology to serve as a basis for a more practical discussion of their injurious aspects and control. Keys are given to the subfamilies, tribes, genera and species, and the systematic relationship of the larvae is indicated, in order that it may be of assistance in the identification of the species in the larval stages and in the recognition of more exact relationships among the adults.

Tothill (J. D.). **Injury to Fire-killed Lumber in New Brunswick by the Softwood Borer.**—*63rd Ann. Rept. Crown Land Dept. New Brunswick 1923,* pp. 86–87. Fredericton, N.B., 1924.

The Longicorn beetle, *Monochamus scutellatus,* attacks spruce, balsam fir [*Abies balsamea*], white pine [*Pinus strobus*] and jack pine [*P. banksiana*] after fires, particularly when these occur in May, June or July, the most susceptible trees being pines of small diameter. Lumber that is killed by fire after 15th July is less subject to injury. Cedar appears to be practically immune. The beetles lay most of their eggs in July in niches cut in the bark. The larvae hatch in a few days and feed under the bark until September, when they begin to tunnel into the wood. They go into hibernation about the second week in October. Unless salvaging operations are carried out the first winter after fire, the burned lumber is likely to prove a complete loss. After a fire there is no shade, and the larvae develop with unusual rapidity. The increased injury by attack during the second summer may be avoided if the logs are stored in water. Immersion in fresh water for several weeks kills the larvae.

Dunn (M. B.) & Jago (R. D.). **Summary Report of the Deterioration of Budworm Killed Timber.**—*63rd Ann. Rept. Crown Land Dept. New Brunswick 1923,* pp. 88–94. Fredericton, N.B., 1924.

The effects of the budworm [*Tortrix fumiferana,* Clem.] appear to be gradually decreasing in New Brunswick ; great damage is, however, caused by the numerous secondary enemies of the weakened and dying trees. These include fungi, *Monochamus scutellatus, Trypodendron bivittatum,* etc. The present investigations were undertaken with the view to arriving at an accurate estimate of the salvage

possibilities of the depreciated timber in order to alleviate the confusion and difficulty existing at present in connection with the adjustment in rates of stumpage. The results are shown in numerous tables, from which it is evident that unless the tree is cut within one year after its death the volume of first grade merchantable saw material obtainable is small. At the end of the third year spruce saw material shows a combined advanced sap and heart rot of over 35 per cent. and balsam fir over 40 per cent., practically an entire loss from this cause alone.

EASTHAM (J. W.). **The Colorado Potato-beetle** (*Leptinotarsa decemlineata*) **in British Columbia.**—*Br. Columbia Dept. Agric.*, Soil & Crop. Circ. 2, 4 pp., 1 fig. [Victoria, B.C., 1923.]

Leptinotarsa decemlineata, Say (Colorado potato beetle), is considered to be firmly established in the East Kootenay region of British Columbia. Its distribution in the Province is discussed, and the importance of vigilance on the part of growers and of prompt measures against the insect when it appears is pointed out. It is hoped that care along the edge of the infested area may result in limiting its occurrence, at least for some years. A brief description of the insect is given and of the usual remedial measures [*R.A.E.*, A, xi, 232, etc.]. Dusting with calcium arsenate at the rate of 4 to 5 lb. per acre proved very successful in 1923 under the dry conditions obtaining.

BRITTAIN (W. H.). **Report of the Professor of Entomology and Zoology and Provincial Entomologist.**—*Ann. Rept. Secy. Agric., Nova Scotia, 1923*, pp. 48–61. Halifax, N.S., 1924.

The work in connection with brown-tail moth [*Nygmia phaeorrhoea*, Don.] in Nova Scotia is reported on by S. L. McLaine; it has been carried out as in former years, a total of 492 nests having been collected as compared with 979 in 1921–22.

The extension work in the control of *Phorbia* (*Chortophila*) *brassicae* is reported on by J. A. Allan. Experiments were made with three different treatments, 1 per cent. creosote with 99 per cent. clay; 99 per cent. tobacco dust with 1 per cent. mercury bichloride; and mercury bichloride in liquid form (1–1280). There was no difference in the percentage of the plants destroyed by the maggot in the three treatments, but in the case of the plot treated with the liquid mercury bichloride a marked difference in the growth and colour of the plants was noticed, showing the additional property of stimulating plant growth possessed by this substance.

SCHOENE (W. J.). **Fourteenth Report of the State Entomologist and Plant Pathologist.**—*Qtrly. Bull. Virginia State Crop Pest Commis.*, v, no. 4, pp. 5–27, 6 figs. Blacksburg, Va., January 1924.

During the period from October 1921 to September 1923, covered by this report, two very important insect pests have appeared in Virginia, namely, the cotton boll weevil [*Anthonomus grandis*, Boh.] and *Epilachna corrupta*, Muls. (Mexican bean beetle). Cotton is relatively an unimportant crop in Virginia; the soil is suitable only in a few localities, and cotton is grown only in rotation with other crops. The low winter temperatures in Virginia may also destroy many of the weevils. An estimate of the loss anticipated in 1924 on account of the weevils is tabulated, and general recommendations

for reducing infestation are given. *E. corrupta*, which first appeared in the autumn of 1922, will probably prove a more serious pest, and owing to the general practice of planting soybeans and cowpeas for forage, it will have every opportunity to spread. As it is not practicable to spray these crops, their cultivation will probably be discouraged. A spray of 1 lb. zinc arsenite powder to 50 U.S. gals. of water is recommended against *E. corrupta*, as well as dusts consisting of 1 part high grade calcium arsenate and 1 part dusting sulphur with 4 parts hydrated lime, or 1 part calcium arsenate to 9 parts hydrated lime. It is expected that *Popillia japonica*, Newm. (Japanese beetle) will appear in Virginia within the next 5 years, judging from the present rate of its spread, and a short account of it is given.

The peach moth [*Cydia molesta*, Busck] is proving a very serious pest in the orchards around Washington, D.C., and investigations on it are being continued, as well as on the codling moth [*Cydia pomonella*, L.], of which a partial third generation seems to occur every year in Virginia. Pine trees have in many cases been killed or seriously injured by *Dendroctonus frontalis*, Zimm. (southern pine beetle) [*R.A.E.*, A, ix, 390]. *Sitotroga cerealella*, Ol. (Angoumois grain moth) has been very injurious where unthreshed wheat is stored in barns for any length of time. The loss during 1922 is estimated at from £100,000 to £500,000, and much of this could be prevented by prompt threshing and by fumigation with carbon bisulphide.

Epilachna borealis, F. (melon beetle) is a serious pest of watermelon vines in the eastern part of the State [*R.A.E.*, A, x, 580], the foliage and sometimes the rind being attacked. Two generations occur annually. The beetles spend the winter chiefly on the bark of trees which they leave in early summer to attack melons, and are usually abundant in the field in early June. After feeding for about 2 weeks, they begin to oviposit, most of the eggs being laid on the lower surface of the leaves during July and August. Both adults and larvae feed almost entirely on the lower surface of the foliage, and this should therefore be treated from 10th to 20th July, especially the foliage within 4 ft. of the crown, which should be kept covered with an arsenical dust, such as 1 lb. calcium arsenate or zinc arsenite to 6 or 8 lb. air-slaked lime, or sprayed with 2 or 3 lb. of either arsenical with 3 lb. of quick lime in 50 U.S. gals. of water.

The bionomics of the woolly aphis [*Eriosoma lanigerum*, Hausm.] are briefly discussed [*loc. cit.*], and it is suggested that if the annual migration from apple to elm could be prevented the injury from this pest would be negligible.

Several leaf-rollers have been very troublesome, particularly on apple, the most abundant being *Eulia velutinana*, Wlk. The foliage of locust trees [*Robinia*] has been much damaged by the locust leaf-miner [*Chalepus dorsalis*, Thunb.], the eggs of which are laid on the lower surface of the leaves, where the young larvae construct mines, causing the foliage to turn brown. *Macrodactylus subspinosus*, F. (rose chafer) has been increasing for the past 4 years, destroying the blossoms and leaves of apple and cherry, and damaging grape-vines. The beetles seem to emerge in pasture fields and feed on the first trees encountered. Isolated vines or small trees can be protected by cheesecloth or other covers, and vineyards or small orchards should be heavily dusted or sprayed with 4 lb. powdered lead arsenate to 100 U.S. gals. water, 1 U.S. gal. treacle making the spray more attractive.

Trees thoroughly coated with Bordeaux mixture before arrival of the beetles usually escape injury.

Aphis sorbi, Kalt. (rosy aphis) caused much damage in commercial orchards, though where nicotine was applied early in the season little harm was done. Dusting as a remedy for this pest seemed to be a failure, but growers who had followed the spray calendar and applied nicotine and lime-sulphur in the delayed dormant application suffered little loss.

Several localities suffered from attacks of *Alabama argillacea*, Hb. (cotton worm), the best remedy being to dust the plants with lead arsenate or calcium arsenate. Flea-beetles have been injurious to tobacco plant beds; their entry should be prevented by making the screen tight, and plants when infested should be dusted with 1 lb. powdered lead arsenate mixed with 4 lb. wood ashes or slaked lime. Apple leafhoppers were abundant in some localities, the chief species being *Empoa rosae*, L., *Erythroneura harti*, Gill., *E. obliqua*, Say, *E. dorsalis*, Gill., and *Empoasca mali*, LeB.

Willey (C. R.). **Comparison of Spray Mixtures as Destroyers of *Aphis* Eggs.**—*Qtrly. Bull. Virginia State Crop Pest Commis.*, v, no. 4, pp. 27–28. Blacksburg, Va., January 1924.

Various sprays have again been tested for their action on Aphid eggs [*R.A.E.*, A, x, 580]. The best results were obtained where nicotine sulphate 40 per cent. was used in combination with other materials, and, on the whole, application in March seemed the most successful. Of particular interest is the effectiveness of lime-sulphur against Aphid eggs when applied in March, 98½ per cent. of the eggs being destroyed.

Hoerner (G. R.). **Latest Developments in Orchard Dusting.**—*Better Fruit*, xviii, no. 8, pp. 12–13 & 49–51. Portland, Oregon, February 1924.

A dusting schedule for 1924 is given for apples, pears, prunes, plums and cherries in Oregon, an attempt having been made to parallel as closely as possible the liquid schedules published in the previous year [*R.A.E.*, A, xi, 220]. Varying programmes are given for the different regions, and the advantages of dusting over spraying are discussed.

Barss (H. P.) & Lovett (A. L.). **1924 Revised Spray Program.**—*Better Fruit*, xviii, no. 8, pp. 30–32. Portland, Oregon, February 1924.

This spray schedule for apples and pears, peaches, cherries, apricots and plums supersedes the previous one [*R.A.E.*, A, xi, 220] and is worked out on similar lines, notes being given on necessary variations of the programme to meet the needs of special localities.

Robinson (R. H.). **The Preparation of Spray Materials.**—*Oregon Agric. Expt. Sta.*, Bull. 201, 15 pp., 1 diagr. Corvallis, Oregon, January 1924.

Instructions are given regarding the best methods of preparing the commoner spray materials, the way of ensuring the best results, and

the value of certain commercial preparations. A graph illustrates the possible combinations of fungicides, stomach poisons and contact sprays, showing those that are recommended and those that are considered dangerous.

Swingle (W. T.), Robinson (T. R.) & May, Jr. (E.). **Quarantine Procedure to safeguard the Introduction of Citrus Plants : a System of Aseptic Plant Propagation.**— *U.S. Dept. Agric.*, Dept. Circ. 299, 15 pp., 13 figs. Washington, D.C., January 1924.

The object of the procedure described in this paper is to ensure that no portion of the original imported citrus plant shall ever be released from quarantine, all parts of the plant and the adhering soil being destroyed or sterilised by fire after clean plants have been propagated on healthy homegrown stock. In some cases fumigation, spraying or dusting may be resorted to. Whenever possible the new growth on recently imported plants is isolated from the old wood by the application of adhesive bands to prevent the migration of any insect pests present. Details are given of the planning and construction of the greenhouses and detention cages.

Gilbert (W. W.) & Popenoe (C. H.). **Diseases and Insects of Garden Vegetables.**— *U.S. Dept. Agric.*, Farmers' Bull. 1371, 46 pp., 65 figs. Washington, D.C., January 1924.

Notes are given on the life-history and habits of the more important insect pests of vegetable crops and recommendations are made for their control. Formulae for the various sprays as well as instructions for the preparation and application of the different remedial measures are included.

Weigel (C. A.) & Sasscer (E. R.). **Insects injurious to ornamental Greenhouse Plants.**— *U.S. Dept. Agric.*, Farmers' Bull. 1362, 80 pp., 91 figs. Washington, D.C., [1923]. [Received 17th March 1924.]

The life-history and habits of the many insects attacking all kinds of greenhouse plants are discussed; instructions are also given for the preparation and application of sprays, dusts and fumigants, including many formulae. The insects are arranged under the plants attacked.

Hanson (H. C.). **Distribution of Arizona Wild Cotton.** (*Thurberia thespesioides*).— *Arizona Agric. Expt. Sta.*, Tech. Bull. 3, pp. 49–59, 3 figs. Tucson, Ariz., 15th April 1923. [Received 17th March 1924.]

The occurrence of Arizona wild cotton (*Thurberia thespesioides*) is of great importance, as this is the food-plant of the wild cotton boll weevil, *Anthonomus grandis thurberiae*, which will also feed on cultivated cotton. A survey has been made to determine the occurrence of both food-plant and insect, and the local distribution of the plant as discovered in Arizona by various investigators is listed and described in detail with a map. The weevil has been reported from seven mountain ranges in Arizona, and further field work will undoubtedly show a still greater distribution. All localities where the food-plant occurs should be thoroughly examined for the weevil.

Smith (G. D.). **Further Experiments with the Florida Method of Boll Weevil Control.**—*Qtrly. Bull. State Plant Bd. Florida*, viii, no. 2, pp. 29–72, 9 figs. Gainesville, Fla., January 1924.

During 1923 further experiments were made with the Florida method of control for the cotton boll weevil [*Anthonomus grandis*, Boh.] [*R.A.E.*, A, xi, 73] particularly with regard to weather conditions and with a view to finding a method of applying the poison that would give quicker mortality.

The results of this work are summarised by the author as follows :— In most cases where the Florida method was properly used a profitable crop of cotton was secured, whereas yields ranging from 27 to 150 pounds per acre were the rule in non-treated fields. Weather conditions during the growing season of 1923 practically prohibited successful dusting of the cotton plants. A poisoned-syrup mixture made by mixing 2 lb. calcium arsenate in ½ U.S. gal. water and then adding 1 U.S. gal. syrup (treacle), when mopped in the buds of the cotton plants, gave much better results than dusting. Syrup is not attractive to the weevil in the sense that weevils will search for it and congregate around it in numbers. However, weevils like to eat syrup, and usually do so when they encounter it. Mortality records secured under cage conditions, and later verified by field experiments, show that after the squares are removed and the buds of the plants mopped with the poisoned syrup mixture mentioned above, most of the adult weevils are killed within 24 hours. Powdered calcium arsenate dusted on the plants by means of a dust gun required from 48 to 72 hours to give about the same result. Mopping the plants after the squares were removed, using the poisoned syrup mixture, was found to be cheaper than making one application of calcium arsenate dust, using a rotary fan type of dust gun, at the rate of about 5 lb. per acre. The Florida method of weevil control can be effectively used under adverse weather conditions if the poison is applied in the form of the poisoned syrup mixture. The farmer can remove squares until about 4 o'clock in the afternoon, or until the day's rain has passed, and then mop the plants with the syrup mixture. If no rain falls before noon of the following day, a second application of the poison is unnecessary. The cost of removing the squares varied from about 2s. 6d. to 8s. an acre, depending on the spacing of the plants in the row and the number of squares on the plants at the time of stripping. A good grade of syrup is preferable to poor grades for weevil poisoning. Any kind of syrup can be used, but the better the grade of syrup the higher the percentage of control that will be secured. Using more than half a gallon of water to the gallon of syrup dilutes the mixture to a point where very rapid evaporation takes place in the hot sunshine. It is desirable that the mixture should retain its syrupy consistency as long as possible. Mopping, with mops made by tying shucks or pieces of burlap on the end of a stick, was found to be more successful than shaking the syrup mixture out of a bottle. By gently pressing the mop down into the bud of the plant there is practically no chance of the weevil escaping the poisoned-syrup mixture. On the other hand, if a drop or two of the mixture is shaken from a bottle on to the top leaves of the plant, there is a chance that the weevil will not find the poisoned syrup until after it has been rendered harmless, either by dew or rapid evaporation.

Recommendations are given for cotton growing in 1924, including the application of the Florida method described above. On very

fertile lands it might be found profitable to lengthen the period of weevil protection by giving one or two applications of calcium arsenate during July, or when the infestation of squares has reached 15 or 20 per cent. Such late applications are expensive and are not likely to be profitable on poor or average land. The cotton crop should be picked as fast as it opens, and immediately after harvest all plants should be totally destroyed.

Quarantine Department Report for Quarter ending December 31st 1923.— *Qtrly. Bull. State Plant Bd. Florida*, viii, no. 2. pp. 73–74. Gainesville, Fla., January 1924.

The principal pests intercepted during the quarter were eggs of blackfly [*Aleurocanthus woglumi*, Ashby] and stellate scale [? *Vinsonia stellifera*] from Bahamas; *Chionaspis salicis*, L., from England; and *Coccus* (*Lecanium*) *viridis*, Green, and black scale [*Saissetia oleae*, Burm.] from Cuba.

GARRETT (C. C.). **Atmospheric Temperature and the Codling Moth.**— *Mthly. Weather Rev.*, li, no. 3, pp. 128–129, 2 figs. Washington, D.C., March 1923. [Received 17th March 1924.]

As a result of constant observation and the keeping of atmospheric temperature records it is now possible to forecast accurately the seasonal life-history of the codling moth [*Cydia pomonella*, L.] [*R.A.E.*, A, xii, 180]. A sample of the records taken is illustrated in the form of a graph showing the relationship between late afternoon and evening temperature and the number of eggs laid by the codling moth daily. When the temperature drops below 60°F., the number of eggs laid drops to zero or nearly so. A temperature of 60° or higher at 8 p.m., for 2 or 3 nights in succession will produce enough eggs to make a spray necessary, and as these eggs will hatch in from 1 to 3 weeks, depending on temperature, the spray must be applied accordingly. If the weather turns cold after these eggs are laid (that is, with maximum temperatures of 70° or lower), the spray would not be necessary for 10 to 14 days, while if it remains warm (75° maximum or higher) the spray should be on in a week. The Weather Bureau at Walla Walla has installed thermometer shelters in 3 different parts of the fruit district, which have been working for the past 5 seasons and have proved of great value in the work of codling moth control.

HOWARD (L. O.). **Insect Parasites of Insects.**—*Proc. Ent. Soc. Wash.*, xxvi, no. 2, pp. 27–46. Washington, D.C., February 1924.

The work in connection with the introduction and establishment of insect parasites of insects in North America is reviewed with special reference to the various obstacles that are encountered. In spite of the many apparent failures it is a promising field and will possibly prove itself one of the principal factors in the ultimate control of many of the most important pests, necessitating the formation of a distinct section of the U.S. Bureau of Entomology to deal with these problems. The aim of such a branch of the service should be to establish in America as many as possible of the parasites and predatory species of definite value from all foreign countries.

GAHAN (A. B.). **Another Seed-Chalcid attacking the Cultivated Grape.** —*Proc. Ent. Soc. Wash.*, xxvi, no. 2, p. 48. Washington, D.C. February 1924.

Prodecatoma phytophaga, Crosby, is recorded as ovipositing in cultivated grapes which were approximately half grown, though this record needs verification by actually rearing the Chalcid from grape seeds.

CHITTENDEN (F. H.). U.S. Bur. Ent. *Lema trilineata* **Oliv. (Coleop.) controlled by an Egg Parasite.**—*Proc. Ent. Soc. Wash.*, xxvi, no. 2, pp. 46–48. Washington, D.C., February 1924.

The Eulophid, *Emersonella lemae*, Gir., is an active parasite of *Lema trilineata*, Ol., in the District of Columbia. It attacks the eggs even before the full complement has been laid and prevents their hatching. *L. trilineata* develops normally on *Datura stramonium*, *Solanum* and *Physalis*, and in the vicinity of the District of Columbia it has for many years been injurious to henbane (*Hyoscyamus*), belladonna and other medicinal plants, though less so to potatoes. Of the latter, at least in this district, it appears to be almost a negligible pest, probably owing to the activities of the egg parasite combined with the disturbance due to the abundance of *Leptinotarsa decemlineata*, Say, which drives it to other Solanaceae for food. It is also probable that the arsenicals used against the latter destroy *Lema trilineata*.

CHITTENDEN (F. H.). U.S. Bur. Ent. **Distribution of** *Epilachna corrupta*, **Muls.**—*Bull. Brooklyn Ent. Soc.*, xix, no. 1, p. 3. Brooklyn, N.Y., February 1924.

Epilachna corrupta, Muls., is at present found in New Mexico, Colorado, Arizona, Alabama, Georgia, Tennessee and Kentucky. In a year or two it will have invaded West Virginia, southern Ohio and Indiana and possibly Illinois and Mississippi. It has already encroached slightly on the western counties of North and South Carolina and Virginia, and occurs in a few localities in Texas and Utah.

CAROTHERS (E. E.). **Notes on the Taxonomy, Development and Life-history of certain Acrididae (Orthoptera).**—*Trans. Amer. Ent. Soc.*, xlix, no. 1, pp. 7–24, 4 pls. Philadelphia, Pa., March 1923. [Received 19th March 1924.]

When rearing various common grasshoppers in cages for cytological research, certain general observations on bionomics have been made. The types of cages suitable for keeping these insects and the best conditions under which they should be kept are described in a practical manner. Observations on the embryonic development include data on hibernation, from which it appears that in certain species the development of the embryo depends entirely on the temperature conditions and up to six generations a year may be obtained, while in others the embryo develops to a certain point and then stops for the winter irrespective of the conditions under which the eggs are kept. Observations on the postembryonic development include data on the growth of different parts and on the gradual appearance of taxonomic characters.

Davidson (W. M.). U.S. Bur. Ent. **Biology of** *Scymnus nubes*, **Casey** (**Coleoptera ; Coccinellidae**).—*Trans. Amer. Ent. Soc.*, xlix, no. 2, pp. 155–163, 1 pl. Philadephia, Pa., June 1923. [Received 19th March 1924.]

Scymnus nubes, Casey, is abundant in the Imperial Valley of California. During 1918 and 1919 it was observed in grain, *Sorghum* and cotton fields preying on the Aphids, *Aphis maidis*, Fitch, *Rhopalosiphum* (*A.*) *prunifoliae*, Fitch, and *A. gossypii*, Glover. This Coccinellid first appeared in March and was active till the end of the year, a few larvae being seen as late as the last week of December 1918. There is a hibernation period in December, January and February. In the field the adults, eggs and larvae were found among Aphid infestations ; the mature larvae usually leave the colony of Aphids to pupate on stubbles, pieces of wood and posts and under rubbish. The pupal stage is the one most frequently met with in casual observation. The records here described were compiled from material bred at Sacramento, where the summer temperatures are lower and the humidity higher than in the Imperial Valley, where the stock was obtained. No period of aestivation was observed.

The time between mating and egg deposition varied from 7 to 30 days with an average of 14·4. An average of 31·5 eggs were deposited in an average period of 26·4 days. At Sacramento the incubation period varied from 4–6 days at midsummer to 10 days in October. At El Centro in May 5 eggs incubated in 5 days. Infertility and mortality rarely occurred in the eggs under observation.

Aphids are the normal food of the larva. In confinement they readily fed on *Myzus persicae*, Sulz., *M. rosarum*, Wlk., *Chromaphis juglandicola*, Kalt., *Rhopalosiphum nervatum*, Gill., and *Aphis rumicis*, L. It is concluded that during its larval stage the Coccinellid eats 40–50 Aphids of the size of the fourth instar. When mealy-bugs were offered as food, the larvae attacked them but their jaws became clogged with the drying juices and they died. At Sacramento the larval stage lasted 15–22 days in July and 20–28 in October, and the pupal stage 4–8 days in July and 21–34 in November. The adult beetles eat a daily average of not more than 4 Aphids in the fourth instar. They are long-lived. The sexes were found to be in the ratio of 4 females to 3 males. The period of development from egg deposition to adult emergence varied from 21 days in midsummer to 61 days in late autumn. Considering the adult female to have a pre-oviposition period of 14 days, the minimum generation period at Sacramento was about 36 days.

Gardner (M. W.) & Kendrick (J. B.). **Tomato Mosaic.**—*Purdue Univ. Agric. Expt. Sta.*, Bull. 261, 24 pp., 13 figs. Lafayette, Ind., May 1922. [Received 22nd March 1924.]

This bulletin summarises the existing knowledge on tomato mosaic. It is readily transmissible from plant to plant by any means in which some of the juice of a diseased plant is introduced into the living tissues of a healthy plant, and is largely spread by insects, especially Aphids, and by certain cultural operations such as pruning and transplanting. It is not transmitted through the seed and does not persist in the soil and litter. It is carried through the winter in certain weeds that send up new shoots from deep rootstocks each spring. In Indiana it has been found on horse nettle (*Solanum carolinense*) and

ground cherries (*Physalis* spp.) as well as other weeds, but from those mentioned it has actually been transmitted to tomatos. Clean cultivation, particularly the destruction of annual and perennial Solanaceous weeds, is an essential factor in control. No transplanting should be done from beds in which the disease is present. In greenhouses all self-sown tobacco and tomato plants should be destroyed as well as all related weeds.

Brown (H. D.). **Greenhouse Soil Sterilization. Part I. Sterilization Methods and Pest Control.**—*Purdue Univ. Agric. Expt. Sta.*, Bull. 266, pp. 1–19, 11 figs. Lafayette, Ind., December 1922. [Received 22nd March 1924.]

A modified tile sterilisation system is described and illustrated. This proved effective in the control of Nematodes, its success being attributed largely to the fact that it was so arranged that all the soil in each house was heated by steam at one time to a depth of 18 inches, thus eliminating the risk of reinfestation. By this method a uniform temperature of 140°F. or above was maintained for 12 hours or longer.

Worthley (H. N.). **The Biology of** *Trichopoda pennipes*, **Fab. (Diptera, Tachinidae). A Parasite of the Common Squash Bug.**—*Psyche*, xxxi, no. 1, pp. 7–16, 1 fig. Boston, Mass., February 1924.

Trichopoda pennipes, F., has a wide distribution in North and South America and the adjacent islands, and is essentially a lowland Tachinid, being most abundant within its range at elevations of 500 feet or less. It has been recorded as attacking several species of Coreids and Pentatomids including *Anasa tristis*, DeG. (squash bug). The eggs are laid on the sides of the abdomen and thorax and take about 30 hours to hatch. The larva burrows through the body-wall of the host and is full grown in about 16 days, when it emerges and pupates in the ground. The second generation larvae appear to remain within the body of the host during the winter, completing their growth when the latter becomes active in the spring. The host dies a day or two after the emergence of the parasite. The pupal period of the spring generation lasts about a month and of the summer generation about 13–19 days. Pairing takes place within 24 hours after emergence. The length of time before oviposition and the average number of eggs deposited have not been determined. In Massachusetts there are two full generations a year. Pupae developing from over-wintered larvae begin to yield flies in late June, and the adults deposit eggs on any squash bugs that are then available. Many of the latter are ovipositing when parasitised, and can often complete their egg-laying before they die. Adult bugs disappear in the middle of July, and the flies are actively laying eggs at this time and often deposit them on bugs destined to die before the parasitic larva has attained full growth. The larvae that do become full grown pupate at the end of July and in early August, emerging as adults in August and early September, and the bugs that are then parasitised never live to sexual maturity. Many nymphs die before becoming adult, and those that reach the adult stage and pass the winter safely are killed by the parasite before laying eggs. No parasites reach maturity in nymphs that die. Only one parasite emerges from a single host. Collections of over-wintered bugs in midsummer show a parasitism of 80 per cent., and there is no reason to suppose that this percentage may not often be as high among the older nymphs and new adult bugs in the autumn.

Cockerell (T. D. A.). **The Name of the Lac Insects.**—*Psyche*, xxxi, no. 1, pp. 47–48. Boston, Mass., February 1924.

The author discusses Chamberlin's monograph of the Tachardiinae [*R.A.E.*, A, xi, 550]. It is pointed out that the generic name *Laccifer*, Oken, has priority over *Tachardia* for these insects, and the name Lacciferidae is proposed to replace Tachardiidae, Ferris.

Aldrich (J. M.) & Webber (R. T.). U.S. Bur. Ent. **The North American Species of Parasitic Two-winged Flies belonging to the Genus *Phorocera* and Allied Genera.**—*Proc. U.S. Nat. Mus.*, lxiii, art. 17, no. 2486, 90 pp. Washington, D.C., 1924.

This paper is an attempt to classify a difficult group of parasitic flies, species of which are often reared in economic work and sent to the U.S. National Museum for identification. The only comprehensive work hitherto published was by the late D. W. Coquillett. The authors have excluded a few of his species, made synonyms of a few, rearranged the genera to conform as conservatively as possible with recent ideas in nomenclature, and have described 41 new species, while recognising 40 previously described North American ones, with a new description of each.

Keys are given to the genera, and to the species of *Nemorilla*, *Zenillia*, and *Phorocera*. The new species include *Zenillia protuberans*, reared from *Malacosoma disstria*, Hb., *Z. formosa*, reared from *Agrotis ypsilon*, Rott., and *Automeris io*, F., *Z. reclinata*, reared from *Estigmene acraea*, Drury, *Phorocera hamata*, reared from *Diprion simile*, Htg., and *P. pachypyga*, reared from *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.).

Guyton (T. L.). **A Taxonomic, Ecologic and Economic Study of Ohio Aphididae.**—*Ohio Jl. Sci.*, xxiv, no. 1, pp. 1–30. Columbus, Ohio, January 1924.

The classification of Aphids is discussed, with notes on their structure and methods of reproduction, as compared with allied insects. A key to the subfamilies is given, followed by a classified list of the Ohio species as well as notes on their occurrence and food-plants and bibliographical references as to synonymy, description and life habits. The influence of environment on Aphids is considered, including such factors as soil, climate, food-plants and migrations, predacious and parasitic enemies, and associated insects.

The latter part of the paper deals with the economic importance of Aphids. Notes are given on the species that attack fruit trees, vegetable and greenhouse crops, small fruits, and shade and forest trees in Ohio, and their relation to grain crop production is discussed. In this connection it is mentioned that the loss to wheat in the United States due to *Toxoptera graminum* in 1907 was estimated at about £3,000,000. The usual remedial measures are indicated, and mention is made of the possibility of control by means of the destruction of intermediate food-plants. This is of much value where only one winter food-plant is known for a destructive species.

White (G. F.). U.S. Bur. Ent. **Hornworm Septicæmia.**—*Jl. Agric. Res.*, xxvi, no. 10, pp. 477–486, 1 pl., 2 figs. Washington, D.C., 8th December 1923.

The larvae of the Sphingids, *Protoparce sexta*, Johan., and *P. quinquemaculata*, Haw. (hornworms of tobacco or tomato) are occasionally attacked by a septicaemia, which may prove fatal. The cause is an organism, here described as *Bacillus sphingidis*, sp. n., which in many respects resembles *B.* (*Coccobacillus*) *acridiorum*, d'Herelle. It is readily destroyed by heat, drying, direct sunlight and chemical disinfection, but lives for a long time in a moist environment at room temperature. No appreciable loss of virulence has been noticed in cultures of the bacillus when kept for four years on artificial media. Little is known of the transmission of the disease in nature, but it probably takes place by way of the alimentary tract; the point of entry is not definitely known, but the bacillus is frequently found between the folds of the stomach wall. Infection seems most likely to occur during the fifth larval instar, a high temperature also being in all probability a predisposing cause. The disease, when inoculated by puncture, runs a course of from 18 hours to 2 or 3 days. After death the larvae become black and shrivelled. A comparatively small percentage of healthy larvae die following inoculation of the virus by feeding, and probably few die of the disease in nature during the active growing season of their food-plants, but practically all of them succumbed following puncture inoculations. Cutworms, the larvae of *Ceratomia catalpae* (catalpa moth) and of *Bombyx mori* (silkworm) and grasshoppers are all very susceptible to puncture inoculations and die rapidly from septicaemia; no insect as yet tried by inoculation has proved to be immune. It is suggested that there is need for a much more comprehensive study of this group of insect diseases.

White (G. F.). U.S. Bur. Ent. **Cutworm Septicemia.**—*Jl. Agric. Res.*, xxvi, no. 10, pp. 487–496, 2 pls., 2 figs. Washington, D.C., 8th December 1923.

A study of a septicaemia of cutworms has shown that the disease is due to an organism here described as *Bacillus noctuarum*, sp. n. The disease, when produced by inoculation puncture, lasts from 2 to 4 days, depending chiefly on temperature, and ends fatally. The bacillus closely resembles *B. sphingidis* as regards its reaction to environment and in the methods and results of inoculation [see preceding paper].

Wade (J. S.) & St. George (R. A.). U.S. Bur. Ent. **Biology of the False Wireworm, *Eleodes suturalis*, Say.**—*Jl. Agric. Res.*, xxvi, no. 11, pp. 547–567, 2 pls., 4 figs. Washington, D.C., 15th December 1923.

The Tenebrionid, *Eleodes suturalis*, Say, has recently become a serious pest of wheat and other small grains in the more recently settled semi-arid regions of the Middle West, in much the same way that the related species of *Eleodes* have previously been recorded [*R. A. E.*, A, vi, 307; vii, 281]. The principal damage is caused in autumn by the larvae feeding upon recently-sown wheat and retarding or preventing the growth of the plant, and widely separated reports of its occurrence

indicate that it will become increasingly injurious in the future. The life-history was studied particularly in southern Kansas from 1914 to 1917. The history and distribution of the beetle are discussed, and all stages are described. The food-plants, which normally consist of the roots and other parts of native grasses and other plants, dead vegetable matter and occasionally animal tissue, under cultivated conditions include wheat, oats, maize, rye, millet, lucerne, *Sorghum*, sugar-beet, beans and potatoes. Wheat is apparently the favourite food, the greatest injury being done by the larvae, although the adults also feed upon it. In autumn the infestation is often confined to impoverished areas in a field, but in spring the larvae may be abundant even among healthy-looking plants in productive areas. The damage is particularly noticeable after a protracted dry spell. Injury to the other crops enumerated is so slight in comparison with that to wheat that a rotation introducing some of these crops, as indicated below, has proved to be an efficient control measure.

Hibernation occurs in the adult stage beneath piles of rubbish, grass, weeds and refuse, or in the burrows of small mammals in soft, sandy soil ; and also in the larval stage, buried deeply in the soil. In southern Kansas oviposition begins in early spring, the adults continuing in the field until late November ; some of the latter have been known to live 2 or 3 years. The eggs, from 10 to 60 frequently in one nest, and averaging 108 in number per female, are deposited nearly 1 in. below the surface in soft loose soil, and after an incubation period of 8 to 10 days the larva hatches and begins to feed. When conditions are favourable the larva reaches maturity in about 110 to 130 days. Pupation takes place in an earthern cell about 3 in. below the soil surface, and lasts about 10 to 22 days. A second generation may be produced in late summer, and larvae of this generation generally spend the winter at a considerable depth in the soil ; they have been found in November 7 inches, and in December 14 inches, below the surface. There is considerable overlapping of the generations. Infestation is often found to originate beneath straw stacks or scattered bundles of grain, and is invariably more severe in their vicinity. Cannibalism is fairly common, especially where the larvae are crowded in the field, but is not sufficiently marked to have any economic influence.

Besides the natural enemies recorded for the related species [*loc. cit.*] the larvae of a species of *Calosoma*, of *Harpalus caliginosus* F., and of an Asilid, *Erax* sp., attack the larvae ; the pupa is sometimes attacked and killed by an ant, *Tetramorium caespitum*, L., and the adult by another ant, *Pogonomyrmex occidentalis*, Cress. The adults are also eaten by chickens and by various birds. The parasite, *Perilitus eleodis*, Vier., seems common and as many as 121 individuals have been reared from a single host. The authors have endeavoured to find satisfactory control measures, experimenting particularly in protection for planted seed and destruction of larvae, pupae and adults. Many of the experiments are described, but none of the measures tried were successful. The most effective method as yet known is rotation of wheat with other crops for two or more seasons, especially with maize or any crop that can be regularly and frequently cultivated. All accumulations of rubbish, dead grass, old straw stacks, etc., that afford shelter and hibernating quarters should be burnt or entirely removed. Effective control measures would probably be found equally applicable to most of the related species of economic importance.

Jones (T. H.). U.S. Bur. Ent. **The Eggplant Leaf-miner,** *Phthorimaea glochinella*, **Zeller.**—*Jl. Agric. Res.*, xxvi, no. 11, 567–570, 1 pl. Washington, D.C., 15th December 1923.

The Gelechiid, *Phthorimaea glochinella*, Zell., which is closely related to *P. operculella* (potato tuber moth or tobacco splitworm), has received very little attention, as it is less important economically and has chiefly been recorded as feeding on the leaves of the weed, *Solanum carolinense*. It has, however, been reported more than once on tomato leaves, and the author has found it to be a common though not a serious enemy of eggplants [*Solanum melongena*] in Louisiana. Its history and distribution are discussed. A translation of Zeller's description of the adult is given, and descriptions of the egg, larva and pupa are added. Moths in confinement deposit eggs on both sides of the leaves of eggplant and the larvae mine along the edge of the leaf, causing distortion and curling. The larva removes the parenchyma and constructs a firm silken tube, in which it is often found, within the mined area. It feeds entirely within the leaf, and when full-grown constructs a loose silken cocoon in which it pupates, apparently just below the soil surface among remnants of dead leaves. Incubation in the insectary occupied about 7 days, the combined larval and pupal stages requiring about 24 days. Larvae have been found in the field from early May to mid-November, so that there are probably several generations in a year. The winter months are apparently passed in the pupal stage.

Hymenoptera reared from larvae of *P. glochinella* include *Chelonus phthorimaeae*, Gahan, *Orgilus mellipes*, Say, *Bassus gibbosus*, Say, *Sympiesomorphelleus bicoloriceps*, Gir., and *Apanteles* sp. These are usually most abundant in autumn, the first 3 being the most numerous. It is not known whether they are primary parasites. A Eumenid wasp, *Ancistrocerus fulvipes*, Sauss., has been observed to remove the larvae from their mines in the leaves of eggplant.

Larson (A. O.) & Simmons (P.). U.S. Bur. Ent. **Notes on the Biology of the Four-spotted Bean Weevil,** *Bruchus quadrimaculatus*, **Fab.**—*Jl. Agric. Res.*, xxvi, no. 12, pp. 609–616, 1 fig. Washington, D.C., 22nd December 1923.

This report summarises some of the results of investigations on *Bruchus quadrimaculatus*, F. (four-spotted bean weevil) that have been carried out during the past years in California on weevils developed from eggs laid in 1919.

The conclusions reached are as follows :—The average length of the developmental periods of larvae of *B. quadrimaculatus* that hatch from eggs laid on successive days in autumn tends to be inversely proportional to the duration of the exposure of the embryos and young larvae to warm weather. The age of a female beetle at the time of laying a given day's batch of eggs influences both the number of eggs in the batch and the vitality of the eggs, as indicated by the percentage of hatching, the ability of the resultant larvae to become adults, and the average duration of the developmental periods of the progeny.

Chittenden (F. H.). U.S. Bur. Ent. **The Argus Tortoise Beetle.**—*Jl. Agric. Res.*, xxvii, no. 1, pp. 43–51, 4 figs., 1 pl. Washington, D.C., 5th January 1924.

The history and literature concerning the Chrysomelid, *Chelymorpha cassidae*, F. (argus tortoise beetle) is reviewed. It feeds on Convolvulaceae, the cultivated sweet potato (*Ipomoea batatas*) being preferred. Both the adults and larvae attack the foliage. The various stages are described. The eggs are deposited in clusters varying from 16 to 28, generally on the lower surface of the leaves, though in confinement they have also been found on the stalks. The seasonal history as observed in the District of Columbia is discussed. There is apparently only a partial second generation in this district, though further south two definite generations probably occur annually. The total life-cycle from egg to adult is 36 days, allowing 10 for the egg period, 19 for the larval and from 7 to 9 for the pupal period. The distribution of the beetle in the United States of America is shown on a map, and it has also been recorded from Canada. Though it has not been recorded from Mexico, several related species occur there.

Three natural enemies have been observed in the District of Columbia: a Chalcidoid egg parasite, *Emersonella niveipes*, Girault; a Tachinid, *Masicera exilis*, Coq., parasitising the larvae; and a Pentatomid bug, *Apateticus bracteatus*, Fitch, predacious on the larvae. The adult beetles have been found in the stomachs of birds, chiefly starlings (*Sturnus vulgaris*) and kingbirds (*Tyrannus tyrannus*).

The beetles are seldom sufficiently abundant to be very destructive, and the plants readily recover from their attack. They may be hand-picked in all stages, and the larvae and adults may be killed with arsenicals.

Barber (G. W.). U.S. Bur. Ent. **The European Corn Borer, *Pyrausta nubilalis* Hbn., versus the Corn Earworm, *Heliothis obsoleta* Fab.**—*Jl. Agric. Res.*, xxvii, no. 1, pp. 65–70, 1 pl. Washington, D.C., 5th January 1924.

Pyrausta nubilalis, Hb. (European corn borer) and *Heliothis obsoleta*, F. (corn ear worm) may be found together on the same plants. The percentage of damage caused to the ears by these two moths is compared and presented in tables, from which it would appear that greater loss is caused by *H. obsoleta*. The figures, however, do not show the injury to the stalk and peduncle by *P. nubilalis*, which often results in more injury than is apparent in actual destruction of grain, as the number of developing kernels may be reduced. This species also continues feeding after *H. obsoleta* has left the food-plant for pupation. A considerable decrease in the yield of grain must therefore be expected should *P. nubilalis* spread to areas heavily infested by *H. obsoleta*.

Larson (A. O.) & Simmons (P.). U.S. Bur. Ent. **Insecticidal Effect of Cold Storage on Bean Weevils.**—*Jl. Agric. Res.*, xxvii, no. 2, pp. 99–105. Washington, D.C., 12th January 1924.

The effectiveness of cold in protecting beans, peas and cowpeas against Bruchids is an acknowledged fact. The authors here record investigations in the use of low temperatures for killing Bruchids that are present in stored pulses, dealing particularly with *Bruchus obtectus*,

Say, in California pink beans (*Phaseolus vulgaris*) and with *B. quadrimaculatus*, F., in black-eye cowpeas (*Vigna sinensis*). The results of the various tests are given. Exposure of larvae, pupae and adults of *B. obtectus* in *P. vulgaris* to 32°F. for 56 days or to 36°F. for 66 days gave very satisfactory control, a heavy infestation (43,700 beetles in 20,500 beans) being completely eliminated. Exposure for so short a time as 22 days rendered the surviving adults incapable of reproduction. In the case of *B. quadrimaculatus*, 39°F. for 32 days was insufficient to kill all stages within *V. sinensis*, but all stages were killed when subjected to 32°F. or colder for 32 days. The eggs were killed by 4 days' refrigeration at 32°F. or 20°F., but a longer time would be necessary to kill them at 39°F. They were more susceptible to cold than the other stages.

Lynch (W. D.), McDonnell (C. C.), Haywood (J. K.), Quaintance (A. L.) & Waite (M. B.). **Poisonous Metals on Sprayed Fruits and Vegetables.**—*U.S. Dept. Agric.*, Bull. 1027, 66 pp. Washington, D.C., 17th April 1922. [Received 27th March 1924.]

In the spring of 1915 a co-operative study was undertaken to ascertain the amounts of arsenic, lead and copper remaining on fruits and vegetables treated with poisonous sprays. Should the results show that the metals remained on the fruit in amounts that might prove injurious to the consumer, they would constitute a basis for so changing or regulating the spraying schedules as to eliminate this danger.

The results of previous investigations by various workers are reviewed, and the technique employed during the present observations is described. The results are presented in numerous tables, which show that provided spraying is carried out in accordance with the schedules recommended by the U.S. Bureaux of Entomology and Plant Industry very little of the material used remains on the fruit or vegetable at harvest time. In the case of overspraying or late spraying comparatively large quantities of spray residues were found in some cases.

When peeled the sprayed fruits and vegetables contain essentially the same amounts of arsenic, lead and copper as the unsprayed products, indicating that practically all of the spray residues can be removed by peeling.

Pierce (W. D.). **Lectures in Applied Entomology. Ser. 1. Pt. 1.**—214 pp. multigraph. San Mateo, Cal., The Mineral, Metal & By-Products Co., 1920–22.

This is the second volume of the lectures previously noticed [*R. A. E.*, A, ix, 244]. The organisation and scope of the work of the professional entomologist is dealt with, emphasis being laid on the need for co-operation and harmony in such work. The purposes and functions of the insectary and of collections are also discussed.

Walden (B. H.). **The Raspberry Fruit Worm, *Byturus unicolor*, Say.**—*Connecticut Agric. Expt. Sta.*, Bull. 251, pp. 91–99, 4 pls., 1 fig. New Haven, Conn., December 1923.

Byturus unicolor, Say (raspberry fruit worm), which has long been a troublesome pest in the United States, was studied in Connecticut during 1921–23. It seems to attack only the red species of raspberries and decidedly prefers certain horticultural varieties. The work of

the adults has, however, been observed on the foliage of black-cap raspberries and the Columbian or purple raspberry. The susceptibility of certain varieties of red raspberry is discussed. There are three distinct types of injury caused by the insect; the adults feed on the unfolding leaves, often skeletonising them; as the blossom buds appear the beetles attack these, eating out the inside, and when numerous they may destroy the whole bud cluster; and the larvae infest the fruit. In many cases they develop in and destroy the fleshy receptacle on which the fruit is borne, causing the fruit to dry up before ripening, or they may feed on the carpels, leading to infection with a fungus causing the berries to decay. In 1921 in an infested field 37 per cent. of the buds were injured by beetles, while nearly 58 per cent. of the ripening berries were infested with larvae. The beetles appear in spring soon after the new growth is started and are abundant on the tips on bright, sunny days in May; on cloudy days they seek protection under the foliage. They feed for some days before mating and ovipositing, eating along the surface of the folded leaves. The beetles can fly for short distances, but do not spread rapidly in the field; they were active until early June, the last being seen on 22nd June. The eggs are deposited singly on the tips, or within the blossoms after the buds open. The incubation period is not known, but full-grown larvae were found on 16th June. Upon leaving the fruit the larvae pupate in small circular cavities in the ground. Beetles were found to emerge in late October in breeding cages, but whether all the adults emerge in autumn is not known. Descriptions of the stages are given.

Arsenical treatments indicated that the beetles can be poisoned by this means, a dust mixture of 40 lb. sulphur, 10 lb. of dry lead arsenate and 5 lb. hydrated lime apparently destroying more beetles in 1922 than a liquid spray composed of 2 lb. lead arsenate powder to 50 U.S. gals. of water with $\frac{3}{4}$ lb. calcium caseinate spreader. The dust probably acted to a certain extent as a repellent. In 1923, a dust mixture composed of 85 lb. of carrier (principally dolomite), 15 lb. dry lead arsenate and 2 per cent. nicotine sulphate was used and seemed to give rather poorer results than the spray. The recommendations are that the foliage should be well coated with lead arsenate from the time the first beetles appear until the blossom buds open sufficiently for bees to visit them. If the fruit is so badly infested as to be unsaleable, the entire fruit clusters should be removed and burnt about the time that the earliest fruit begins to ripen. The eggs have practically all been laid at this time and few, if any, of the larvae have left the fruit for pupation. Thorough shallow cultivation close to the plants from late summer to early autumn will expose the pupae, which are generally less than 1 in. below the surface and are very fragile and readily succumb to such treatment. If poultry can be turned in among the plants in the autumn, they will destroy many larvae and pupae.

GARMAN (P.). **The European Red Mite in Connecticut Apple Orchards.** —*Connecticut Agric. Expt. Sta.*, Bull. 252, pp. 103–125, 4 pls., 2 figs. New Haven, Conn., December 1923.

Injury to the foliage of apple trees by *Paratetranychus pilosus*, C. & F., was first observed in Connecticut in 1920. A detailed account is given of its distribution, life-history and habits in Connecticut as well as recommendations for its control. Most of the information

given has been noticed previously. Although insect enemies appear to be able to destroy this mite almost completely once every two or three years, they cannot be entirely relied upon, and it is recommended that a definite spray schedule be adopted in orchards where it is abundant.

The natural enemies recorded from Connecticut are *Leptothrips mali*, Fitch, *Scolothrips sexmaculatus*, Perg., *Haplothrips* sp., *Triphleps insidiosus*, Say, *Stethorus punctum*, Lec., and *Seius pomi*, Parrott.

AINSLIE (G. G.). **Webworms injurious to Cereal and Forage Crops and their Control.**—*U.S. Dept. Agric.*, Farmers' Bull. 1258, 16 pp., 12 figs. Washington, D.C., May 1922. [Received 27th March 1924.]

Maize and grass of all kinds (meadows, pastures, lawns, etc.) form the normal food of webworms, which are the cause of considerable losses in the middle eastern United States. A general life-history of the webworms is given, with notes on the chief species, including *Crambus caliginosellus*, Clem. (corn webworm); *C. mutabilis*, Clem. (striped webworm), *C. teterrellus*, Zinck. (bluegrass webworm), *C. vulgivagellus*, Clem. (black-headed sod webworm), *C. trisectus*, Wlk. (leather-coloured sod webworm), and *C. praefectellus*, Zinck. (silver-striped webworm). The recommendations are cultural methods in maize fields, such as early autumn ploughing, disking in the spring, the application of fertiliser and the sowing of sound seed. In grasslands remedies are difficult, and it is generally best to plough up the grass and plant the field with some immune crop.

HOWARD (L. O.). U.S. Bur. Ent. **A Side Line in the Importation of Insect Parasites of Injurious Insects from one Country to Another.**—*Proc. Nat. Acad. Sci.*, viii, no. 6, pp. 133–139. Washington, D.C., June 1922. [Received 27th March 1924.]

The apparent failure of an introduced parasite in the control of the species against which it was originally introduced may be partly accounted for by the fact that it readily attacks other introduced or native insect pests of trees and crops. Several examples of such adaptation are given, including the Tachinid, *Compsilura concinnata*, Meig., which, though originally introduced into the United States against *Porthetria dispar*, L., and *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoca*, L.), has become an important parasite of some 25 other American Lepidoptera. When possible, both specific and general parasites should be introduced against any given insect pest.

SEVERIN (H. C.). **Fourteenth Annual Report of the State Entomologist of South Dakota for the period ending June 30, 1923.**—42 pp., 14 figs. Brookings, S.D. [1923.]

The more important insect pests recorded for 1922–23, of which a brief account is given, include *Ceresa bubalus*, F. (buffalo tree-hopper); *Oecanthus nigricornis*, Wlk. (black-horned tree-cricket); *Rhagoletis pomonella*, Walsh (railroad maggot); *Eriocampoides limacina*, Ratz. (*Caliroa cerasi*, L.) (plum slug); *Melasoma* (*Lina*) *interrupta*, F. and M. (*L.*) *scripta*, F. (cottonwood leafbeetles); *Mineola indiginella*,

Zell. (leaf crumpler); *Papaipema nitela*, Gn. (stalk borer); *Hemerocampa leucostigma*, S. & A. (white-marked tussockmoth); *Aegeria* (*Synanthedon*) *pictipes*, G. & R. (plum-tree borer); *Conotrachelus nenuphar*, Hrbst. (plum curculio); *Aphis forbesi*, Weed (strawberry root-louse); and *Chrysobothris femorata*, F. (flat-headed borer).

SEVERIN (H. C.). **Second Report upon the Membracidae of South Dakota.**—*14th Ann. Rept. State Ent. S. Dakota*, pp. 27–33. Brookings, S.D. [1923.]

Following a preliminary report upon the MEMBRACIDAE of South Dakota [*R.A.E.*, A, x, 367], a list is given of the Membracids that the author has captured within the boundaries of South Dakota, with dates of capture of the adults and the food-plant on which they were taken. *Ceresa bubalus*, F. (buffalo tree-hopper), which is one of the few Membracids of any economic importance, is dealt with more fully, an account being given of its life-history, the injury it does to various trees and plants, including apple, pear, plum, elm, poplar, willow, lucerne, potato and aster, and remedial measures, which include removal of the weeds on which the insects feed and the burning of infested twigs.

SHERMAN (F.). **Report of Division of Entomology.**—*45th Ann. Rept. N. Carolina Agric. Expt. Sta., 1921–22*, pp. 54–61. Raleigh, N.C., 1922. [Received 31st March 1924.]

The various entomological projects have been carried on much as in previous years and are briefly reviewed. The value of 1 lb. ordinary laundry soap to 40 U.S. gals. water for the control of Aphids has been clearly demonstrated, and so far only an unidentified species on chrysanthemums has proved resistant. The soap should be cut in thin slices and completely dissolved in half the quantity of water by boiling and stirring. If the remainder of the water is then added cold, the mixture will be at the right temperature for easy application. It has proved effective against the cabbage aphis [*Brevicoryne brassicae*, L.], the rose aphis [*Macrosiphum rosae*, Réaum.], the black peach aphis [*Anuraphis persicae-niger*, Smith], the turnip aphis [*Aphis pseudobrassicae*, Davis] and other species.

WILSON (C. E.). **Report of the Entomologist.**—*Rept. Virgin Islands Agric. Expt. Sta., 1922*, pp. 15–18. Washington, D.C., 15th December 1923.

Coccids were very numerous in the Virgin Islands in 1922, probably owing to drought. Only two, *Hemichionaspis minor strachani* and *Pseudaonidia tesserata*, can be added to the lists previously given [*R.A.E.*, A, ix, 429; xi, 206]; the former did considerable damage to *Melicocca bijuga* and the latter to grape-vines. A species of *Odonaspis* severely infested the joints of Para grass.

Sugar-cane insects were more numerous than during the two previous years, especially the grubs of *Strategus titanus* (rhinoceros beetle) and *Diaprepes abbreviatus* (West Indian sugar-cane borer), for which a good remedy was 100 parts of bagasse and 3 to 5 parts of Paris green, handfuls of which were placed in holes every few feet and the holes filled with soil. *Laphygma frugiperda* (fall army worm) damaged

the cane plants by eating the tender leaves, and the borers, *Lagochirus araneiformis* and *Metamasius sericeus*, destroyed 10 per cent. of the crop.

Although tobacco is not now a commercial product in the Islands, a brief account is given of the insects attacking it, in case it should be grown on a larger scale in the future. The pests dealt with are *Protoparce sexta* (tobacco-worm moth), *P. rustica* (tomato worm), *Epitrix parvula* (tobacco flea-beetle), *Dicyphus* sp. (tobacco suck-fly), *Heliothis virescens* (tobacco budworm) *H. obsoleta* (corn earworm), *Oecanthus niveus* (snowy tree cricket), *Diaprepes abbreviatus*, and *Lasioderma serricorne* (tobacco beetle).

A description is given of trap pans for vegetable pests, baited with treacle and water with a kerosene film. It was observed that with a high wind, no rain and a temperature of 70° F., or higher, many moths were caught, while with a light wind, rain and a temperature below 68° F., the catch was small. It was concluded, however, that treacle does not attract small moths and that pests of vegetables cannot be controlled by this means.

Camacho (C.). **La Agricultura de Tacna.**—27 pp., 3 figs. Tacna, 5th April 1923. [Received 9th March 1924.]

This report is the result of an inspection, in November 1922, in Tacna, the most northern province of Chile. Most of the insect pests found also occur in other parts of Chile.

Among citrus pests, *Lepidosaphes beckii* and *Saissetia oleae* are abundant. The trees should be pruned and the trunks and large branches scrubbed and smaller branches sprayed with a 10 per cent. petroleum emulsion or a solution of calcium polysulphide of 5° B. *Aleurothrixus porteri* and *Dialeurodes citri*, which appear to have three generations a year, are combated by pruning and spraying with petroleum emulsion. Against *Toxoptera aurantii* and *Aphis gossypii* a decoction of tobacco should be mixed with the petroleum emulsion spray.

Olive pests are *S. oleae* and *Aspidiotus hederae*, and cotton is infested by *A. gossypii*. Tomatos and potatoes are attacked by *Epitrix cucumeris*.

The foliage of rose, *Azalea*, *Camellia*, palm, orange and other plants is attacked by *Pantomorus godmani* (*Aramigus fulleri*), and the roots by the larva of this beetle. The eggs are laid at the base of the shoots or on the stems. The ground should be disinfected with carbon bisulphide, and sticky bands and arsenical sprays are also useful.

Brèthes (J.). **Varios himenópteros de la América del Sud.** [Various Hymenoptera from South America.]—*Nunquam Otiosus, II*, pp. 6–16. [Buenos Aires], 28th January 1924.

The new species described include the Braconids, *Protapanteles marquesi*, parasitising *Papilio* sp. in Brazil, and *Coeloides anastrephae* and *Bracanastrepha* (gen. n.) *argentina*, parasitising *Anastrepha fraterculus*, Wied., in Argentina; the Cynipid, *Eucoila* (*Psichacra*) *pelleranoi*, also a parasite of *A. fraterculus* in Argentina; and a Chalcidid, *Phaenodiscus bertonii*, parasitising *Lecanium* sp. in Paraguay.

DE AZEVEDO MARQUES (L. A.). **Vespa "versus" Lagarta. Nota prévia sobre a biologia da vespinha** *Protapanteles marquesi* **Brèthes, inimiga natural da lagarta da borboleta diurna** *Papilio anchisiades capys* **Hübner.** [A Preliminary Note on the Biology of *P. marquesi*, a Natural Enemy of the Butterfly, *P. anchisiades capys*.]—*Chacaras e Quintaes*, xxix, no. 2, pp. 109–110, 1 plate. S. Paulo, 15th February 1924.

Protapanteles marquesi, Brèthes, parasitises the caterpillars of the butterfly, *Papilio anchisiades capys*, Hb., infesting orange trees at Rio de Janeiro.

TORREND (C.). **Fungos parasitas de larvas.** [Fungi parasitic in Larvae.]—*Chacaras e Quintaes*, xxix, no. 2, pp. 122–123, 1 fig. S. Paulo, 15th February 1924.

Examination of some Coleopterous larvae infested with a fungus shows the latter to be probably *Cordyceps melolonthae*.

REED (C. S.). **La Concuna o Isoca de las Alfalfares de Mendoza** (*Colias lesbia* **Fabr.**). [*C. lesbia*, the Caterpillar of the Lucerne Fields of Mendoza.]—*Minist. Ind. y Obras Publicas, Provincia de Mendoza*, 20 pp., 4 figs. Mendoza, 1922. [Received 26th March 1924.]

The lucerne butterfly, *Colias lesbia*, F., is very abundant and injurious in lucerne fields in Argentina. The eggs are usually deposited on the lower surface of the leaves, sometimes on the stems, or, rarely, in the inflorescences. In summer the egg-stage lasts 6–8 days, the larval 16–25, and the pupal 12–20. The first generation hibernates in the pupal stage, the adult appearing in September. The flight of the second occurs in November; that of the third, at the end of December or early in January; and that of the fourth, in March. Three Tachinids parasitise *C. lesbia*, as well as two Braconids, but they are probably not of economic importance. Birds are considered to be the real check on *C. lesbia*, and specimens of the quail, *Lofortix californicus*, have been imported from Chile and have been liberated in the hope that it may become established.

BONDAR (G.). **Alguns Curculionideos nocivos á videira.** [Some Curculionids injurious to the Grape Vine.]—*Correio-Agricola*, ii, no. 2, pp. 42–45, 2 figs. Bahia, February 1924.

In February and March 1921 an infestation of grape vines by a number of weevils was observed in the State of Rio de Janeiro. The adults are usually found feeding on the shoots of indigenous plants, chiefly Leguminosae, in forest clearings, and the larvae probably live in felled trees, as the majority of larvae of the weevils of this type are found in Brazil in rotting vegetable matter. The infested vineyard had been planted in recently cleared ground close to other clearings in which felled trees were lying. Each vine-stock harboured an average of 10 weevils, many of the leaves being withered and others lying on the ground. In the preceding September there had been an even more severe outbreak, from 20 to 30 individuals being taken on a stock. *Hypsonotus nebulosus*, Jek., represented 80 per cent. of

the catches, *H. clavulus*, Germ., 5 per cent., and *Lordops gyllenhali*, Dalm., 5 per cent., while the remaining 10 per cent. included *H. umbrosus*, Germ., *Naupactus decorus*, F., *N. longimanus*, F., *N. bipes*, Germ., *Compsus niveus*, F., *Rhigus tribuloides*, Pall., *Eustalis ambitiosus*, Boh., *Cyphus gibber*, Pall., and *Platyomus prasinus*, Boh. The weevils may be collected by jarring, but repeated collection is necessary, and a better method consists in spraying with a solution of Paris green 1 lb., quicklime 2 lb., water 100 gals. Bordeaux mixture may be used; it renders the foliage distasteful to the pests. Likely breeding places should be eliminated.

Bondar (G.). **Praga das Roseiras na Bahia.** [A Pest of Roses in Bahia.]—*Correio-Agricola*, ii, no. 2, pp. 46–47, 1 fig. Bahia, February 1924.

During the prolonged drought rose bushes in the State of Bahia have been infested by *Stylothrips bondari*, Morg. The larvae and adults puncture and discolour the leaves. Fully developed leaves are preferred. Ordinarily the rains wash off and kill the thrips and the injury is less marked. *Terminalia catappa*, *Eucalyptus globulus* and grape vines are also infested. Repeated applications of a kerosene-soap emulsion are effective. A stock solution to be diluted with 9 parts water for use may be prepared by dissolving 5 lb. soap in 2 gals. boiling water, and then adding 4 gals. kerosene. A nicotine spray may be prepared by boiling 4 lb. of leaf-tobacco refuse in 1 gal. water. One part of this infusion should be diluted with 4 parts water, a little soap being added.

Tattersfield (F.) & Morris (H. M.). **An Apparatus for testing the Toxic Values of Contact Insecticides under controlled Conditions.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 223–233, 2 figs., 2 pls. London, March 1924.

This paper is summarised by the authors as follows: An apparatus for determining the relative toxicities of contact insecticides is described in detail. It is so arranged that successive batches of insects are sprayed under conditions as similar as possible, so that on using various substances at different concentrations, the results are directly comparable.

The apparatus consists of a glass jar in the lid of which an atomiser is fixed. By means of compressed air at known pressure the atomiser throws a constant quantity of fine spray upon insects placed in a dish inside the jar. Photographs illustrating the details of the apparatus are given.

The method used in practice for the spraying of Aphids in this apparatus is described, and examples are given, in the form of a table and a graph, of the type of results obtained when different concentrations of nicotine are sprayed upon apterous agamic females of *Aphis rumicis*.

Two notes from the Statistical Department at Rothamsted are included, one analysing the accuracy with which the instrument sprays, and the other giving reasons for regarding the concentrations that kill 50 per cent. of the insects sprayed as the most suitable for the direct comparison of the toxicity of insecticides.

China (W. E.). **A Preliminary Revision of the Oriental Species of *Leptocorisa*, Latr. (Hemiptera, Coreidae).**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 235–239, 14 figs. London, March 1924.

The species of the genus *Leptocorisa*, which are serious pests of rice in the East, are extremely alike in general appearance and are therefore easily confused. In order to facilitate their identification several species are here re-described, and a key based on superficial characters has been prepared, which is, however, by no means comprehensive of all the forms and varieties of this difficult genus. The species are most readily separated by the structure of the male genital claspers.

The species dealt with are: *L. acuta*, Thunb.; *L. varicornis*, F.; *L. corbetti*, sp. n., from Sumatra, Malaya, China, etc.; *L. geniculata*, sp. n., from the Philippine Islands; *L. lepida*, Bredd.; *L. costalis*, H.S.; and *L. discoidalis*, Wlk.

Plotnikov (V. I.). **Some Observations on the Variability of *Locusta migratoria*, L., in Breeding Experiments.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 241–243. London, March 1924.

A long series of breeding experiments on *Locusta migratoria*, L., have been conducted by the author with a view to obtaining an idea as to what may be the factors that cause the variation in the species, and, especially, the transformation of the solitary phase *danica*, L., into the swarming one [*cf. R.A.E.*, A, ix, 561]. The results show that neither temperature, moisture, nor light are of importance in this respect, but that the typical larvae of the solitary phase when kept crowded in a cage transform to the swarming phase after two or three moults, while the swarming larvae may be transformed into those with the coloration of the solitary ones if kept singly. These results are in full agreement with those obtained with *Locustana pardalina*, Wlk., by Faure [*R.A.E.*, A, xi, 508].

Maulik (S.). **A New Hispid Beetle injurious to Oil Palms in Brazil.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 245–246, 1 fig. London, March 1924.

Cephalolia elaeidis, sp. n., is described from Brazil as occurring on African oil palm (*Elaeis guineensis*). It probably feeds normally on some indigenous species of palm and has adapted itself to the introduced food-plant.

Laing (F.). **A New Psyllid injurious to Fig Trees.**—*Bull. Ent. Res.*, xiv, pt. 3, p. 247, 1 fig. London, March 1924.

Trioza buxtoni, sp. n., is described from Palestine, where it was taken in galls on the leaves of *Ficus carica*.

Miles (H. W.). **On the Life-history of *Boriomyia* (*Hemerobius*) *nervosa*, Fab. (Planipennia, Hemerobiidae).**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 249–250. London, March 1924.

The eggs of *Boriomyia nervosa*, F., are laid singly on the undersides of leaves near the veins or on the dead bodies of Aphids that are adhering

to the leaves. The larvae feed on the body juice of Aphids, preferably the young ones, this stage lasting about 14 days. Pupation occurs in a rough loose cocoon in bark crevices or curled leaves, and was also noticed in the bands placed on fruit trees for *Anthonomus pomorum*. The cocoons in the bands were found in October, and the larvae in them apparently remained quiescent until the following spring, many of them pupating in March. The pupal stage lasted 14 days. In captivity the first brood pupated by the 3rd May, the total life-cycle occupying about 65 days. There are evidently two generations a year, with a probable third in hot dry seasons. The adults also feed on Aphids.

The Cynipids, *Aegilips fumipennis*, Weston, *Anacharis ensifer*, Wlk., and *A. eucharoides*, Hal., were reared from the larvae of *B. nervosa*.

Buxton (P. A.). **Applied Entomology of Palestine, being a Report to the Palestine Government.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 289-340, 9 figs., 5 pls., 1 map. London, March 1924.

This report is divided into four parts, the first of which deals with the topography of Palestine, the climate and the fauna in general; the second and third being devoted to medical entomology and the fourth to agricultural pests. Brief notes are given on some 50 species recorded, including the Cecidomyiid, *Perrisia oleae*, Lw., which is extremely common all over the country wherever the olive grows, though it does not appear to reduce the crop seriously; the Trypetids, *Ceratitis capitata*, Wied., causing serious damage to apricots and also infesting nectarines and even oranges, and *Dacus oleae*, Gmel., many of the larvae of which are probably killed in the olives in the course of the pickling processes; the Aphid, *Brevicoryne brassicae*, L., a serious pest of cabbage; the Coccid, *Chrysomphalus aonidum*, L., at present only occurring in North Palestine, where it is a serious pest of orange and lemon trees, and where a fumigation campaign is being carried out to prevent, if possible, its spread to the Jaffa area; the Psyllid, *Trioza buxtoni*, Laing, causing serious injury to fig trees (*Ficus carica*) at Jericho; *Pieris brassicae*, L., a serious pest of cabbage and cauliflower, which has also been bred from *Capparis spinosa* and *Tropaeolum majus*, and is parasitised by *Apanteles glomeratus*; *Virachola livia*, Klug, occurring on *Acacia farnesiana*, apparently recorded for the first time from Palestine; the Buprestids, *Capnodis carbonaria*, Klug, *Chalcophora stigmatica*, Dalm., and *Aurigena chlorana*, C. & G., serious pests of almond; and the Cerambycid, *Cerambyx dux*, Fald., also a serious pest of almonds. The almond is an important crop in Palestine, and the enlargement of the area is under consideration; this is, however, not thought advisable unless the farmers attend to the boring beetles, which should be easily controlled during their short season by handpicking.

A complete list of the Orthoptera collected is to be published elsewhere; brief notes are here given on the local distribution and abundance of the more important species, which include *Gryllotalpa gryllotalpa*, L., a serious pest, particularly in market gardens; and *Locusta migratoria* ph. *danica*, L., of which the swarming phase has not been found, indicating that conditions in Palestine are not favourable for producing mass swarms. It is not a serious pest, the great damage occurring periodically being apparently due to *Schistocerca*

gregaria, Forsk. (*peregrina*, Ol.), but the author has never found the latter during three summers' collecting and suggests that it only breeds in the years following incursions.

Boas (F.). & Merkenschlager (F.). **Die Lupine als Objekt der Pflanzenforschung.** [The Lupin as an Object of Plant Research.]—viii + 144 pp., 63 figs. Berlin, P. Parey, 1923.

This work includes short notes on the insect pests of lupins. The seedlings are seriously attacked by the larvae of *Anthomyia funesta*, and all stages of the plant by the weevils, *Sitona grisea*, *S. lineata* and *S. crinita*. Yellow lupins are not so badly infested as those of other colours. *Tetranychus telarius*, *Cicadula sexnotata*, *Thrips flava*, *Epicometis* (*Oxythyrea*) *hirta*, *Tylenchus dipsaci* (*devastatrix*) and the Galerucid, *Diabrotica quindecimpunctata*, also attack this plant. *Euxoa* (*Agrotis*) *segetum* and *Heterodera schachtii* infest the roots, and the seeds are attacked by the larvae of *Etiella zinckenella* and *Pegomyia planipalpis*. The larvae of *Asphondylia lupini* prevent the growth of the pods.

A beetle, *Mazanita serica*, is very destructive to lupins in California.

Grassé (P.). **La biologie des Acridiens ravageurs français.**—*Rev. Zool. agric. & app.*, xxii, nos. 10 & 11, pp. 269–282, 297–314, 10 figs. Bordeaux, October & November 1923. [Received 31st March 1924.]

A brief outline, mainly taken from the literature, is given of the life-histories of *Calliptamus italicus*, L., and *Dociostaurus maroccanus*, Thunb., and the principal food-plants of both species are enumerated. Tropisms and reflexes of various grasshoppers are discussed at some length, and certain figures are quoted to illustrate the connection between the rate of metabolism and temperature and humidity. Existing theories of migrations of locusts are reviewed and that of Uvarov [*R.A.E.*, A, ix, 561 ; xi, 307, 471] is supported by the author.

Genieys (P.). **Les Vers des tiges du Maïs. A propos de *Sesamia nonagrioides* Lef.**—*Rev. Zool. agric. & app.*, xxii, no. 11, pp. 314–317. Bordeaux, November 1923. [Received 31st March 1924.]

Sesamia vuteria, Stoll (*nonagrioides*, Lef.) appeared in unusual abundance in Gers during 1922. Though this moth is always present in the maize fields, its numbers are as a rule kept down by natural factors, of which climatic conditions are among the most important. The larvae remain in the stubble throughout the winter ready for pupation in the spring, but only the very young larvae are able to withstand winter frosts. The critical temperature for the larvae as observed under field conditions appears to be in the neighbourhood of 7° C. [19·4° F.], the number killed increasing with the severity and duration of the frost.

Natural control cannot be, however, relied upon in mild winters, and the importance of burning all the stubble is pointed out. Even if the roots are not entirely destroyed by fire, the heat will be sufficient to kill the larvae [*cf. R.A.E.*, A, xii, 95].

Feytaud (J.). **La Mouche de la Betterave** *Pegomyia hyoscyami* **var.** *betae.*—*Rev. Zool. agric. & app.*, xxii, no. 11, pp. 317–320. Bordeaux, November 1923. [Received 31st March 1924.]

Pegomyia hyoscyami var. *betae* is a serious pest of beet in the vicinity of Vienne, France. The adult flies appear from April to June, according to the latitude. The eggs are attached to the lower surface of the leaves, and the young larvae immediately penetrate to the parenchyma. This stage lasts two or three weeks, pupation occurring in the same leaf or occasionally in the top layer of the soil. The latter is the more usual position for the last generation, which passes the winter in this stage. There are at least three generations a year, which appear to overlap considerably, the greatest damage being done by the first. Eggs are laid on *Chenopodium album*, but this wild food-plant does not appear to be attacked when beet leaves are available. The various methods that have been suggested from time to time for the control of *P. hyoscyami* var. *betae* are briefly reviewed; they include the use of trap crops, clean cultivation and a break in the cultivation of beets in order to starve the pest. None of these have proved satisfactory. Kerosene alone or with nicotine has sometimes proved successful on young plants. The kerosene apparently has a repellent effect on the adults.

Nouvelles mesures prises contre le Doryphore.—*Rev. Zool. agric. & app.*, xxii, no. 11, pp. 320–322. Bordeaux, November 1923. [Received 31st March 1924.]

These regulations, enforced on 3rd August 1923, describe the infested area in the Gironde and the measures to be undertaken by all farmers in such areas against *Leptinotarsa decemlineata*.

Blanc (L.). **La Fourmi de l'Argentine.**—*Rev. hortic. Algérie*, xxviii, no. 3, pp. 62–64. Algiers, March 1924.

The importance of preventing the further spread of the Argentine ant [*Iridomyrmex humilis*, Mayr] in France is pointed out, and the remedial measures to be adopted are described. The poison baits recommended are similar to those previously noticed [*R.A.E.*, A, ix, 251; xi, 310].

T[rabut] (L.). **Preparation d'un arséniate de plomb colloidal.**—*Bull. agric. Algérie-Tunisie-Maroc*, xxx, no. 3, pp. 64–65. Algiers, March 1924.

The preparation of a good lead arsenate spray is discussed. The mixture advocated is colloidal lead arsenate used in the United States against *Popillia japonica* [*R.A.E.*, A, xii, 161], the preparation of which is explained.

Bertin (C.). **A propos des arséniates de plomb.**—*Rev. agric. Afr. Nord*, xx, no. 244, pp. 220–221. Algiers, 4th April 1924.

As lead arsenate is now being so largely used in insecticidal work, the author discusses the qualities to be looked for in the special brands that are offered to the public.

VAYSSIÈRE (P.). **Importance économique d'un parasite des grains de café : les cafés piqués.**—*Rev. Hist. nat. appl.*, Ière Partie, v, no. 1, pp. 26–32. Paris, January 1924.

This summary of the knowledge concerning *Stephanoderes hampei* Ferr. (*coffeae*, Haged.) differs little from one already noticed [*R.A.E.*, A, xii, 39].

DE SEABRA (A. F.). **Note sur l'importance des champignons entomophages dans l'agriculture tropicale.**—*Exposition Internat. Cent. Pasteur, Congr. Path. Vég.*, pp. 41–42. Strasburg, 1923. [Received 7th April 1924.]

The importance of fungi in the control of insect pests, particularly under tropical conditions, is pointed out, examples being given of the efficiency of various fungi in San Thomé.

TROUVELOT (B.). **Étude de l'invasion de Criquets italiens apparue en Seine et Marne en 1921–1922.**—*Exposition Internat. Cent. Pasteur, Congr. Path. Vég.*, pp. 44–45. Strasburg, 1923. [Received 7th April 1924.]

Calliptamus (*Caloptenus*) *italicus* (Italian locust) appeared in abundance in the Rhône Valley and the Paris region during the summer of 1922. In the latter region, where the locusts had been observed in increasing numbers during the two preceding years, the most damage was done to beet, sainfoin and young potato sprouts. During June oats were also attacked, but wheat and maize did not appear to suffer. Remedial measures started at the beginning of June gave promising results. During their application, however, an epidemic of *Empusa grylli* broke out and caused the death of practically all the locusts within a day. In spite of the spread of the disease amongst *C. italicus*, other Orthoptera occurring in the same locality were not affected. The outbreak of *E. grylli* was preceded by a few cold and damp days following upon a period of heat and sunshine.

TROUVELOT (B.). **Observations sur le mode de ponte de l'** *Habrobracon johannseni* **(Vier.). Hymenoptère braconide parasite de la Teigne des pommes de terre.**—*Exposition Internat. Cent. Pasteur, Congr. Path. Vég.*, pp. 46–48. Strasburg, 1923. [Received 7th April 1923.]

The method of oviposition of *Habrobracon johannseni*, Vier., a parasite of the potato tuber moth [*Phthorimaea operculella*, Z.] is described in detail and is similar to that adopted for the construction of the feeding tube [*R.A.E.*, A, x, 86]. The position of the cocoon of the host is apparently immaterial.

COTTE (J.). **Observations sur une mycose des cochenilles.**—*Exposition Internat. Cent. Pasteur, Congr. Path. Vég.*, p. 50. Strasburg, 1923. [Received 7th April 1924.]

A fungus, *Cladosporium lauri*, appeared in great abundance on laurels infested with *Aonidia lauri*, Bch., and *Coccus* (*Lecanium*) *hesperidum*, L., in the south of France. The Coccinellid, *Chilocorus bipustulatus*, L., was also present in small numbers. *A. lauri* appeared

to be most severely attacked by the fungus ; but as the latter is so largely dependent on atmospheric conditions, it is not considered of any great economic value in the control of these pests.

FAURE (J. C.). **Mode de succion de** *Pachyneuron* **sp., Chalcidien parasite des pupes de** *Syrphus balteatus* **De G.**—*Exposition Internat. Cent. Pasteur, Congr. Path. Vég.*, pp. 51–53. Strasburg, 1923. [Received 7th April 1924.]

The method of feeding of *Pachyneuron* sp. [see next paper] through a tube constructed with its ovipositor through the pupal case of its host, *Syrphus balteatus*, is very similar to that recorded for other species by Lichtenstein and Trouvelot [*R.A.E.*, A, x, 86].

FAURE (J. C.). **Nouvelles observations biologiques sur un** *Pachyneuron* **sp., parasite des pupes de** *Syrphus balteatus* **De G.**—*Rev. Path. vég. & Ent. agric.*, x, pt, 4, pp. 255–258. Paris, October–December 1923.

The species of *Pachyneuron* here discussed appears to be morphologically identical with *P. aphidis*, Bch., but as a result of a study of its life-history, it must either be a distinct species or the record of Aphid hosts for *P. aphidis* must have been erroneous. The present species attacks the pupae of *Syrphus balteatus*, DeG. The eggs are inserted through the pupal case and deposited on the body of the host larva, on which the parasitic larvae feed. The entire development from egg to adult takes place inside the pupal case of the host, occupying from 26 to 30 days in June and July, both under laboratory and natural conditions in the Rhone Valley. As many as 44 individuals may issue from one host pupa. The method of oviposition is compared with that of feeding of the adults. The tube constructed for feeding [see preceding paper] may apparently serve for more than one individual.

FAURE (J. C.). **Note sur un Hémiptère prédateur.**—*Rev. Path. vég. & Ent. agric.*, x, pt. 4, pp. 253–254. Paris, October–December 1923. [Received 7th April 1924.]

Nabis ferus, L., is recorded as attacking the larvae of *Pieris brassicae*, L. The mode of attack is described ; no preference is shown for larvae of any particular age.

MAYNÉ (R.). **A propos de dégats de différents** *Strophosomus* **sur le Pin sylvestre.**—*Rev. Path. vég. & Ent. agric.*, x, pt. 4, pp. 259–267, 2 figs. Paris, October–December 1923. [Received 7th April 1924.]

Young plantations of *Pinus sylvestris* were almost completely destroyed in the vicinity of Antwerp during 1923 by *Strophosomus lateralis*, Payk., *S. curvipes*, Thms., *S. capitatus*, DeG., *S. rufipes*, Steph., and *S. retusus*, Marsh. These weevils are of little economic importance in older stands of conifers, but are very destructive to one-year-old plants. Only adults were observed in the case under consideration, and *S. lateralis* and *S. curvipes*, which are considered rare in Belgium, proved the most abundant species. This may be

accounted for by the fact that the area occupied by the young pine trees was previously a heath, where these species usually occur, so that when the adults emerged they attacked the pine as the nearest available food. This would also account for the comparative lack of injury to pines bordering on heaths.

The infestation was completely checked by 20th July, the methods employed being systematic hand collection of adults, and the use of trenches with vertical sides arranged so as to surround the infested area.

GAUMONT (L.). **Les Chenilles tileuses ou Hyponomeutes du Pommier** (*Hyponomeuta malinellus*, **Zell.**) **et leurs parasites dans le Gâtinais pendant l'été 1923.**—*Rev. Path. vég. & Ent. agric.*, x, pt. 4, pp. 326–331, 5 figs. Paris, October–December 1923. [Received 7th April 1924.]

During the summer of 1923 *Hyponomeuta malinellus*, Zell., was particularly abundant in the Gâtinais region, almost the entire apple crop being destroyed. Owing to the activities of parasites, however, this moth is not expected to occur in similar numbers in 1924. The parasites recorded were *Pimpla examinator*, F., *Pteromalus variabilis*, Ratz., *Tetrastichus crassinervis*, Thoms., and *Ageniaspis fuscicollis*, Dalm. Of these the Chalcid, *A. fuscicollis*, is particularly useful and its propagation and distribution on future occasions is urged.

Owing to the periodical occurrence in large numbers of *H. malinellus* or *Anthonomus* [*pomorum*], only every third or fourth year proves a good year in this cider-producing region. These pests are periodically checked by their respective parasites, *A. fuscicollis* and the Ichneumonid, *Pimpla pomorum*, Ratz.

LÉCAILLON (M. A.). **Sur la biologie de la Mouche de la Betterave** (*Pegomyia hyoscyami* **Panz.**) **et sur le rôle que cet insecte peut jouer dans le développement de la jaunisse de la plante.**—*Rev. Path. vég. Ent. agric.*, x, pt. 4, pp. 337–338. Paris, October–December 1923. [Received 7th April 1924.]

During the summer of 1922 *Pegomyia hyoscyami*, Panz., was found in large numbers on beet in the Aisne district. The plants were also heavily infected with yellows, usually produced by *Bacillus tabificans*. On the plants infested with *P. hyoscyami*, the disease appeared to spread outwards from the portion attacked by the flies. Though the disease may occur in the absence of any insects, it is believed that any injury, whether due to insects or any other cause, will probably predispose the plant to it.

MÈGE (M.). **Ennemis et maladies de la betterave observés au Maroc.**—*Rev. Path. vég. & Ent. agric.*, x, pt. 4, pp. 339–341. Paris, October-December 1923. [Received 7th April 1924.]

The principal pests recorded during the seasons of 1921–22 and 1922–23 on beet in Morocco include the following insects: *Euxoa* (*Agrotis*) *segetum*, *Phytometra* (*Plusia*) *gamma*, *Phthorimaea* (*Lita*) *ocellatella*, *Pegomyia hyoscyami*, *Atomaria linearis*, *Sitona* (*Sitones*) *lineata*, *Conorrhynchus* (*Cleonus*) *mendicus*, *Lixus junci*, *Cassida nobilis*, and *Heterodera schachtii*.

Paillot (A.). **Sur *Chalcis femorata* Panz., nouveau parasite hyménoptère des chrysalides de *Pieris brassicae* L.**—*Rev. Path. vég. & Ent. agric.*, x, pt. 4, pp. 342–345. Paris, October–December 1923. [Received 7th April 1924.]

During a recent outbreak of *Pieris brassicae*, L., in the region of Lyons *Apanteles* was exceptionally scarce, whereas pupal parasites were particularly abundant, these being *Pteromalus puparum*, L., and *Chalcis femorata*, Panz. The adults of the latter emerged about the middle of August and apparently do not require food and only occasionally take a little water. Their activities depend chiefly on the presence of sunshine. There is apparently only one generation a year, though under laboratory conditions a partial second generation was bred.

Cunliffe (N.). **Notes on the Biology and Structure of *Myzaphis abietina*, Walker (The Green Spruce Aphis.).**—*Qtrly. Jl. Forestry*, xviii, no. 2, pp. 133–141. London, April 1924.

As *Myzaphis abietina*, Wlk., is becoming increasingly prominent on *Picea* spp., an investigation was made in 1922 regarding its rate of reproduction. Certain data obtained in an earlier investigation [*R.A.E.*, A, ii, 618] are recorded. In 1922, it was found that wingless females underwent 4 moults before reaching maturity, an extra stage being interpolated in the case of the winged females. At a mean temperature of about 60° F., each immature stage lasted about 4 days, the wingless females becoming adult in 16 days, and living for about 17 days afterwards. The wingless female is capable of depositing a larva the day after reaching maturity, and deposited 70 per cent. of her larvae at the rate of 1 or 2 every one or two days. The average period of larval deposition was 14½ days, the average number of larvae deposited being 12. On seedlings in an outdoor insectary the rate of increase at about 60° F. was 1,200 per cent. in 25 days, and was unlikely to have been less in the field, although the influence of repressive agents was unknown. Reproduction must, however, be much more rapid to produce an epidemic. The conifer spinning mite, *Oligonychus ununguis*, Jacobi, in many cases accompanied *M. abietina*, and it is possible that bad silvicultural conditions, especially defective drainage, may be equally favourable to both species. As *M. abietina* has also been recorded on *Pinus* and *Abies*, larvae, apterous and alate females were placed on needles of silver fir [*Abies pectinata*] and Douglas fir [*Pseudotsuga taxifolia*] and various pines and larches. In no case did the adults attempt to feed and all died within 7 days. The larvae made attempts to feed on all except the Douglas fir, but died within 5 days without moulting.

Observations on the structure and dimensions of *M. abietina* in the various stages of development are appended.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, viii, no. 3, pp. 264–265. Pretoria, March 1924.

Pyrausta nubilalis, Hb. (European corn-stalk borer) is recorded as having been discovered at Durban in a shipment of broom-corn from Hungary. Reports have been received regarding the effect of spraying citrus trees with arsenicals; it is said that the acidity of the fruit is diminished and the flavour thus impaired, and that the

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effect is noticeable in the second and even the third crop that sets after the application of the spray. A larva of *Listroderes nociva*, Lea, has been discovered feeding on turnip leaves at Port Elizabeth. This is a Brazilian species, and is a serious pest of tomatos and potatoes in Australia and in the southern United States [*R.A.E.*, A, xi, 109, 505].

Tucker (R. W. E.). **Pear Leaf Blister Mite** (*Eriophyes pyri*, **Pag.**).—*Jl. Dept. Agric. Union S. Africa*, viii, no. 3, pp. 316–328, 10 figs. Pretoria, March 1924.

An account is given of *Eriophyes pyri*, Pag. (pear leaf blister mite), which, from studies made in western Cape Province in 1921–23, was found to be the cause of abnormal falling of blossoms and young fruit of pears. A description of the female is given, and the life-history and habits are discussed. Wind is the distributing agent. The injury consists of killing or crippling buds, fall of blossoms, fall of newly set fruit and general weakening of the tree. In badly infested orchards, at least 25 per cent. of the crop may be destroyed; the susceptibility of several varieties is compared. The most successful spray was lime-sulphur 33° to 36° Bé., containing a spreader and diluted to 1 in 75 parts of water. Nursery stock should be fumigated with ½ oz. sodium cyanide, ⅝ fl. oz. sulphuric acid and 1 fl. oz. water per 100 cu. ft. of space (the usual strength for fumigating deciduous trees), or immersed in hot water between 122° F. and 131° F. for 3 minutes.

Jarvis (E.). **The Life-history and Control of Insects affecting Sugar-cane in North Queensland.**—*Queensland Agric. Jl.*, xxi, pts. 1 & 2, pp. 28–33 & 91–97. Brisbane, January & February 1924.

The most formidable of the insect pests affecting sugar-cane in North Queensland is *Lepidoderma albohirtum*, Waterh. (grey back cockchafer), a detailed account of which is given. Experiments with various remedial measures against this pest are discussed, including the collection of the beetles, the use of light traps and of baits with attractive odours, the cutting down of feeding trees, poisoning the food-plants, the application of soil deterrents such as coal tar, naphthaline, or calcium chloride, the use of poison baits, and soil fumigation with paradichlorobenzene or carbon bisulphide, as well as the value of natural enemies. Most of the information has been noticed from time to time in this *Review* from monthly reports.

Other sugar-cane pests of importance are *Lepidiota frenchi*, Blackb., *Rhabdocnemis obscura*, Boisd., *Anoplognathus boisduvali*, Boisd., and *Phragmatiphila truncata*, Wlk. Besides these, there are numerous miscellaneous insects that are responsible for minor damage to the roots, stems and leaves of the plants, a list of which is given.

Froggatt (J. L.). **Entomological Notes.**—*Queensland Agric. Jl.*, xxi, pt. 2, pp. 120–123, 3 figs. Brisbane, February 1924.

Brief notes are given on the more important pests of various crops. The cotton pests are : *Heliothis* (*Chloridea*) *obsoleta*, for which maize has been successfully used as a trap crop; *Dichocrocis punctiferalis* (spotted maize moth), which is very similar to it in habits; *Earias huegeli* (rough boll worm); *Euxoa* (*Agrotis*) *radians* (brown cutworm) and *Neocleptria punctifera*, causing considerable damage to young

cotton plants ; *Anomis erosa* (*Cosmophila xanthindyma*) feeding on the foliage ; the Chrysomelids, *Monolepta rosea* and *Rhyparida australis*, the latter being new on cotton in Queensland ; *Nysius vinitor* (Rutherglen bug) ; *Oxycarenus luctuosus* (coon bug) ; *Tectocoris banksi* (Chinese bug), which may be destroyed by removing and burning the egg-masses and young bugs ; the cotton-stainer, *Dysdercus sidae* ; the locust, *Chortoicetes terminifera* ; and termites.

Pests of other crops are : *H. obsoleta*, *Isodon puncticollis* and *Dacus ferrugineus* (*Chaetodacus tryoni*) on tomatos ; *Lonchaea splendida* on tomatos and chillies ; *D. ferrugineus* var. *solani* on chillies ; *Galeruca semipullata* and *Monochamus* (*Monohammus*) *mixtus* on fig trees ; and *Agromyza phaseoli* on beans.

Gowdey (C. C.). **The Principal Agricultural Pests of Jamaica.**—*Dept. Agric., Jamaica*, Ent. Bull. no. 2, 86 pp., 7 pls. Kingston, 1923. [Received 7th April 1924.]

The insect pests of agriculture, as occurring in Jamaica, are dealt with under the crops attacked, viz., sugar-cane, banana, citrus, coconut, coffee, cacao, maize, cotton, sisal, tobacco, sweet potato, yam, grape, pineapple, mango, avocado, cabbage, tomato, cucumber and melon, with a chapter on pests of stored foodstuffs. Under each insect listed a brief account is given of the various stages, life-history and habits, as well as of the most suitable remedial measures. The general methods of prevention and control are discussed in a separate chapter, instructions and formulae being included for the preparation of various sprays, dusts, fumigants, etc.

The pests to which particular attention is given include : *Laphygma frugiperda*, S. & A. (fall army worm), feeding on most forage and truck crops other than Cucurbitaceae ; *Cosmopolites sordidus*, Germ. (banana borer), apparently confined to the banana, all varieties of which are attacked impartially ; *Aleurocanthus woglumi*, Ashby (citrus black fly), recorded from 75 food-plants, of which the favourite appear to be *Citrus* spp., coffee and mango ; *Leucoptera coffeella*, Staint. (coffee leaf-miner) ; *Heliothrips rubrocinctus*, Giard (red-banded thrips) on cacao ; *Heliothis* (*Chloridea*) *obsoleta*, F. (corn ear worm), of which there are at least three generations in Jamaica ; *Scyphophorus acupunctatus*, Gyll. (sisal weevil) ; *Protoparce sexta jamaicensis*, Kirby (horn worm) on tobacco ; and *Cylas formicarius elegantulus*, Summ. (sweet potato weevil).

Ogilvie (L.). **Notes on Plant Diseases and Pests.**—*Agric. Bull. Bermuda Dept. Agric.*, ii, no. 12 ; iii, nos. 1–3, pp. 7–8, 6–7, 6–7 & 6–7. St. George's, December 1923 & January–March 1924.

Zinckenia fascialis (Hawaiian beet webworm) attacks beets and chards in Bermuda ; calcium arsenate dust is recommended against it. Citrus trees infested with *Lepidosaphes beckii* (purple scale) should be thoroughly sprayed with oil emulsion, which has also proved effective against *Eucalymnatus tessellatus* (tessellated palm scale) on sugar-apple [*Anona squamosa*], mango and galba [*Calophyllum calaba*], and should also be effective against *Pseudococcus nipae*. *Morganella maskelli* (fig scale) should be sprayed with lime-sulphur (1 : 10), or with oil emulsion. Lime-sulphur sprays should also be continued against *Diaspis* (*Aulacaspis*) *pentagona* (oleander scale).

Prospaltella berlesei, liberated against this scale, has not been found, but another parasite, probably originating from the imported twigs, has been found in widely-separated localities. Cutworms are sometimes troublesome; the usual recommendations against them are given. For *Ceratitis capitata* (Mediterranean fruit-fly) on loquats [*Eriobotrya japonica*], the Mally fruit-fly remedy is suggested. Against leaf-hoppers causing hopperburn of potatoes, two or three applications of 4 : 4 : 50 Bordeaux mixture are recommended, or lime and copper sulphate dust. *Cosmopolites sordidus* (banana borer) is prevalent wherever bananas are grown in unsuitable soil or are not properly cultivated. Attention should be paid to proper cultivation, rotation of crops where possible, and systematic trapping with baits of banana stems or bulbs.

Coquillett (D. W.). **A new Genus and Species of Trypetidae infesting Asparagus in South Africa (Diptera).**—*Proc. Ent. Soc. Wash.*, xxvi, no. 3, pp. 64–66. Washington, D.C., March 1924.

In this posthumous paper, edited by J. M. Aldrich and supplemented by notes by J. E. Collin, *Zacerata asparagi*, gen. et sp. n., from South Africa, where it was bred from asparagus in 1908, is described.

Ewing (H. E.). U.S. Bur. Ent. **New Tarsonemid Mites (Order Acarina, Family Tarsonemidae).**—*Proc. Ent. Soc. Wash.*, xxvi, no. 3, pp. 66–69. Washington, D.C., March 1924.

Tarsonemus phyllophorus, sp.n., is described from *Phyllostachys bambusoides* in Florida and *Phyllostachys* sp. in Japan, *Locustacarus trachealis*, gen. et sp. n., from the tracheae of grasshoppers in Kansas, and *Tetrapolipus rhynchophori*, sp. n., from *Rhynchophorus palmarum*, in Panama.

Mason (P. W.). U.S. Bur. Ent. **A new Genus and Species of Aphids (Homoptera).**—*Proc. Ent. Soc. Wash.*, xxvi, no. 3, pp. 49–52, 1 pl. Washington, D.C., March 1924.

Neoamphorophora kalmiae, gen. et sp. n., is described from alate and apterous viviparous females taken on *Kalmia augustifolia* in Maine.

Gillette (C. P.) & List (G. M.). **Fourteenth Annual Report of the State Entomologist of Colorado for the Year 1922.**—*Office State Ent. Colorado*, Circ. 38, pp. 1–24, 7 figs. Fort Collins, Colo., June 1923. [Received 10th April 1924.]

The inspection work for 1922 is reviewed, and a brief summary is given of the State quarantines that have been in effect during the year. Among the pests recorded is *Aspidiotus howardi*, Ckll., which causes more loss to pears than the San José scale, *A. perniciosus*, Comst.; owing to its habit of migrating to the fruit, infestations that are hardly noticeable on the trees result in 25 or 50 per cent. of the fruit being pitted. *A. ancylus*, Putn., attacked cherry and currants, and in one nursery elm and maple. It does not migrate to apple and pear, and is seldom noticed on these fruits even though it is quite common. Three scales recorded for the first time in Colorado are *Lecanium corni*, Bch., on oaks, which is a serious fruit pest in other

States, *A. aesculi*, Johnson, on twigs of the butternut, *Juglans cinerea*, and *Lecaniodiaspis pruinosa*, Hunter, on poplars and American elms.

Euschausia ingens, H. Edw. (yellowpine tent-caterpillar) was found eating the needles of small yellow pines [*Pinus ponderosa*] and doing much damage to the trees. The caterpillars leave the nests when fully grown, and seek secluded places in which to spin cocoons. The tents should be cut out and burned whenever this moth becomes sufficiently numerous to do serious harm. The caterpillars could doubtless be destroyed by means of an arsenical spray.

NEWTON (J. H.). **Alfalfa Weevil,** *Phytonomus posticus*. **Progress Report for 1922.**—*Office State Ent. Colorado*, Circ. 38, pp. 24–28, 2 figs. Fort Collins, Colo., June 1923. [Received 10th April 1924.]

The history of the dissemination of *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.) (alfalfa weevil) in Colorado since 1917 is briefly described. There was less injury, less spread and more parasites of the weevil during 1922 than ever before. Since the introduction of *Bathyplectes curculionis*, Thoms., parasitism has increased to as much as 50 per cent. in certain localities. Only two places were found where the weevil had spread beyond the former known boundary. The results of experiments with calcium arsenate in dust and liquid form were inconclusive.

CORKINS (C. L.). **Grasshopper Control.**—*Office State Ent. Colorado*, Circ. 38, pp. 28–31. Fort Collins, Colo., June 1923. [Received 10th April 1924.]

During 1922 there were numerous small scattered outbreaks of *Melanoplus bivittatus*, Say, over the agricultural sections of Colorado, but in two counties only were campaigns carried out. The grasshoppers hatched mostly in lucerne fields, and little migration took place until the first crop had been cut. The best poison bait formula per acre that is practicable on land of low production value is 2 bushels sawdust, 50 lb. bran (free of shorts), 1 U.S. pint sodium arsenite (8 lb. As_2O_3 per U.S. gal.), 5 lb. salt, 2 U.S. gals. sugar beet refuse molasses, 3 oz. amyl acetate (banana oil) and 10–12 U.S. gals. water. In the eastern section of the State grasshoppers injured winter wheat.

A serious invasion of the mormon cricket [*Anabrus simplex*, Hald.] occurred in one area, but united efforts saved the crops and the formula previously recommended [*R.A.E.*, A, xi, 210] is effective if properly used. Attention has already been called to the fact that sodium arsenite is more efficient than white arsenic in poison baits for grasshoppers [*R.A.E.*, A, xii, 17].

NEWTON (J. H.). **Dust versus Spray for Codling-moth Control, Paonia, Colorado, 1922.**—*Office State Ent. Colorado*, Circ. 38, pp. 31–43, 1 chart, 3 figs., 5 tables. Fort Collins, Colo., June 1923. [Received 10th April 1924.]

In the tests described against the codling moth [*Cydia pomonella*] one calyx and four cover applications of lead arsenate were made, their timing being based on laboratory observations of a large number of moths. The percentages for harvest counts are given, but as infested apples tend to fall to the ground and thus escape consideration,

the only true basis of calculation of codling moth injury is on both harvest and windfall fruit for the season. These percentages are: free from codling-moth injury, 78 for dusting and 94 for spraying; free from larvae, 83 for dusting and 98 for spraying; infested apples, 16 for dusting and 1·5 for spraying; and apples having calyx larvae, 3·29 for dusting and 0·01 for spraying. The ratio of stings to total injuries is interesting. The sum of the stings and larvae may be taken as an index of the infestation and the stings as an index of the larvae killed, while their ratio may indicate the efficiency of treatment. For all varieties the spray killed a higher percentage of the larvae that tried to enter the fruit than did the dust. The results obtained by growers with spray schedules are tabulated. An average of only 5·8 per cent. infested harvest fruit from 20 growers was recorded. Some had almost as clean a crop as that produced by spraying in the experimental orchard. This report should not be taken as conclusive evidence of the relative value of dust and sprays, but the data at hand do not indicate any protection from the dust comparable with that from the liquid sprays.

YETTER, Jr. (W. P.). **Lime-sulphur Tests.**—*Office State Ent. Colorado*, Circ. 38, pp. 45–47. Fort Collins, Colo., June 1923. [Received 10th April 1924.]

As it has been claimed that sprays made from proprietary dry lime-sulphurs, containing sugar, are more effective than those made from liquid lime-sulphur, tests were made on apple trees infested with San José scale [*Aspidiotus perniciosus*] of the value of the dry products and also to see if, where sugar was added to smaller amounts of liquid lime-sulphur, it would be as effective as the regular amount used with no sugar present. No recommendations can be made until several years' work under various conditions have been completed. From the results, which are tabulated, it would appear that calcium caseinate does not increase the killing quality of the lime-sulphur. In one plot sprayed with 8½ U.S. gals. liquid lime-sulphur to 200 U.S. gals. water with the addition of 2 lb. calcium-caseinate and 5 lb. granulated sugar 1·02 per cent. more scales were killed than in another plot sprayed with no materials added. These low dilutions gave almost as good results as in cases where twice the amount of lime-sulphur was used. Fourteen U.S. gals. liquid lime-sulphur to 200 U.S. gals. water with the addition of 5 lb. granulated sugar gave the best results secured in any of the liquid plots.

MELANDER (A. L.). **Division of Entomology.**—*32nd Ann. Rept. Washington Agric. Expt. Sta. 1921–22*, Bull. 175, pp. 21–25. Pullman, Wash., December 1922. [Received 7th April 1924.]

In experiments for controlling the codling moth [*Cydia pomonella*, L.] attention was chiefly given to spreaders. It was found that the omission of a spreader (calcium caseinate, soap or glue) did not detract from the insecticidal value of an application, and doubling the usual strength of lead arsenate gave no advantage. The fruit, however, showed less blotching. Treatment against subterranean insects was tried with sodium cyanide in powder and solution, calcium cyanide, carbon bisulphide, ground tobacco, nicotine solution and para-dichlorobenzene, but in no case were any long-range effects observed,

dead insects being found only within a foot or so of the point of administration. Against *Otiorrhynchus sulcatus* and *O. ovatus* in cranberry bogs and strawberry fields respectively carbon bisulphide fumigation under cover was tried, but only negative results were obtained.

Fumigation with hydrocyanic acid gas against the cranberry fireworm [*Rhopobota naevana*] gave uncertain results. Spraying the eggs with miscible oil was more promising.

MELANDER (A. L.). **Division of Entomology.**—*33rd Ann. Rept. Washington Agric. Expt Sta. 1922–23,* Bull. 180, pp. 26–29. Pullman, Wash., December 1923. [Received 7th April 1924.]

As a result of spraying against codling moth [*Cydia pomonella,* L.] in 1923, the conclusions were reached that the calyx spray must not be omitted; calcium and magnesium arsenate proved inferior to lead arsenate, and the addition of a spreader (calcium caseinate) gave slightly better results.

In soil treatments for subterranean insects, carbon bisulphide was found to permeate the soil very quickly, particularly if damp; hydrocyanic acid gas forced into the soil kills beetles (*Tribolium*) at a distance of 2 ft. within a few minutes; paradichlorobenzene gave no toxic effects even after 3 days' exposure. Wireworms were attracted to baits during June, but showed little response during July. A dough made with flour or bran proved very attractive, the addition of sugar, oranges, lemons, etc., adding little to its attractiveness. Mixing poisons with baits proved quite unsuccessful, even with caged wireworms. Soil fumigants administered to the baits after wireworms had collected gave varying results, petrol being the most promising, carbon bisulphide somewhat less so, calcium or sodium cyanide fairly effective and cyanamide completely harmless.

CROWLEY (D. J.). **Cranberry Investigations in Pacific County.**—*33rd Ann. Rept. Washington Agric. Expt. Sta. 1922–23,* Bull. 180, pp. 73–75. Pullman, Wash., December 1923. [Received April 1924.]

The cranberry fireworm [*Rhopobota naevana*] caused losses amounting to 50 to 75 per cent. of the cranberry crop in Pacific County, Washington. Spraying with nicotine sulphate, 1 part to 800 parts water, was ineffectual, but at double this strength very good results were obtained. The weevils, *Otiorrhynchus ovatus* and *O. sulcatus* were kept in check by winter flooding, and where this was not possible, 1 oz. sodium cyanide to 15 U.S. gals. water, using 1 gal. of solution per sq. ft., was effective.

HOUSER (J. S.). **The Apple Flea-weevil,** *Orchestes pallicornis,* **Say.**—*Ohio Agric. Expt. Sta.,* Bull. 372, pp. 397–434, 16 figs. Wooster, Ohio, June 1923. [Received 7th April 1924.]

Rhynchaenus (*Orchestes*) *pallicornis,* Say (apple flea-weevil) has become very destructive of recent years over a large area in Illinois and a limited section of Ohio, and a study has been made of its life-history and habits. The stages are described. The food-plants include elm, alder, hazelnut, quince, chokecherry, hawthorn, wild crab (*Pyrus coronaria*), willow and service berry (*Amelanchier*), but

it is definitely injurious only to the cultivated apple. The eggs are laid in one of the thicker veins of the lower surface of the leaf and the young larva feeds on the parenchyma, constructing a mine with a blistered end in which it pupates. The adults emerge in May and June, feed on the leaves for about a month, and then seek winter quarters under grass, leaves, or rubbish on the ground. In spring they re-appear when the apple leaves begin to unfold, creeping up the trunks or flying to the leaves. There is only one generation in a year, the egg stage lasting about a week, the larval 17 days and the pupal about 5 or 6 days In cases of severe infestation the destruction of foliage due to the larval mines and the punctures of the adults seriously weakens the tree and renders it worthless.

The most effective check is the white muscardine fungus, *Sporotrichum globuliferum ;* there are also several Hymenopterous parasites that attack either the larva or pupa in the mine ; these include *Zatropis incertus,* Ashm., *Epiurus* sp., *Derostenus pallipes,* Gahan, *Pleurotropis* sp., *Sympiesis* sp. and some Eulophids.

Experiments in remedial measures that have been carried out during the past 8 years include tests with banding materials, spraying and dusting with poisons or contact insecticides, burning the hibernating beetles in grass and rubbish under trees, and cultivating the orchard. Thorough cultivation, close to the trees, proved the most successful measure, the hibernating beetles being buried deep in the soil and the ground kept free from shelter or hibernation quarters for the adults. Summer applications of a kerosene emulsion spray, containing 7½ per cent. of kerosene, killed practically all the beetles. Kerosene emulsion at 10 per cent. strength was effective against the hibernating beetles. In orchards that had been so cultivated as to concentrate the hibernating beetles under the trees, burning their shelter by means of a powerful kerosene blow-torch proved effective.

Nelson (J. A.), Sturtevant (A. P.) & Lineburg (B.). **Growth and Feeding of Honeybee Larvae.**—*U.S. Dept. Agric.,* Bull. 1222, 37 pp., 13 figs. Washington, D.C., 14th March 1924.

Part i of this paper, by Nelson and Sturtevant, deals with the rate of growth of the larvae of the honeybee ; part ii, by Lineburg, with the feeding of the larvae.

Corkins (C. L.). **Mormon Cricket Control.**—*Office State Ent. Colorado,* Circ. 40, 20 pp., 13 figs. Fort Collins, Colo., August 1923. [Received 10th April 1924.]

Anabrus simplex, Hald. (mormon cricket), which had been restricted to negligible numbers in Colorado by natural conditions during 1904–1912, appeared in scattered local infestations in 1922, causing partial or total losses of crops. A description of the species and an account of its habits are given. The planning and organisation of a campaign against it is described. The formulae for poison bran mash that proved most successful are as follows : (No. 16 Colorado grasshopper bait) 100 lb. bran (free of shorts), 5 lb. crushed rock salt, 3 oz. pure amyl acetate (banana oil), 3 U.S. pints sodium arsenite (50 per cent. As_2O_3) and 10 to 11 U.S. gals. water ; and (No. 17 Colorado grasshopper bait) as above, but substituting 1 quart any cheap grade treacle for the amyl acetate. Instructions are given in the method of preparing

and applying these poisons. Attention is called to the necessity for poisoning while the crickets are small, and completing operations before they are more than one-half to two-thirds grown. Two or three applications are usually necessary, at from 5 to 7 day intervals.

Weiss (H. B.) & West (E.). **Notes on the Judas Tree Leafhopper, *Erythroneura aclys* McAtee, in New Jersey (Homop.).**—*Ent. News*, xxxv, no. 4, pp. 129–132. Philadelphia, Pa., April 1924.

Erythroneura aclys, McAtee, has heavily infested *Cercis canadensis* (Judas tree) in New Jersey. The eggs were laid under the tissue of the lower leaf surface, usually close to a vein. The nymphs feed singly or in loose colonies. It is thought that it hibernates as an adult. The immature stages are described.

Frost (S. W.). **Two little-known Leaf-miners of Apple (Lepid.: Tineidae; Col.: Curculionidae).**—*Ent. News*, xxxv, no. 4, pp. 132–134. Philadelphia, Pa., April 1924.

Lyonetia speculella, Clem., mines the leaves of apple during the entire larval stage. Pupation occurs on the lower surface of the leaf. This Tineid has been abundant in Eastern Pennsylvania during recent years. *Rhynchaenus* (*Orchestes*) *pallicornis*, Say, has at times been equally abundant. The larvae mine the leaves of apple, cherry, elm and alder. The adults feed on the foliage, eating out small holes. The adult weevil has been recorded as feeding on the flowers of *Amelanchier* and on the leaves of willow.

Hayes (W. P.) & McColloch (J. W.). **A new Species of *Anomala* (Coleop. Scarabaeidae).**—*Ent. News*, xxxv, no. 4, pp. 138–140. Philadelphia, Pa., April 1924.

Anomala kansana, sp. n., is described from Kansas.

O'Kane (W. C.), Cleveland (C. R.) & Hadley (C. H.). **Surface Treatments for the Cabbage Maggot.**—*New Hampshire Agric. Expt. Sta.*, Tech. Bull. 24, 42 pp. Durham, N.H., June 1923. [Received 15th April 1924.]

This is a report on experiments during 1914–22 with insecticides against *Phorbia* (*Chortophila*) *brassicae*, Bch., in New Hampshire. The earliest cabbages are subject to the most severe attack. In the southern part of the State two periods of abundance of adult flies occur, the first coinciding with the early dates for setting out the plants and the second 6 to 8 weeks later. Adults in captivity lived for an average of about 17 days. Eggs were laid only when food was supplied, and were deposited in a cavity in the ground.

Banana pulp, mixed with $\frac{1}{2}$ U.S. pint of water and $\frac{1}{8}$ oz. sodium arsenite to each banana, attracted and killed large numbers of flies, and was successful when scattered in the field, but the larvae and pupae were unaffected by it. Experiments with various substances applied to the surface of the soil indicate that a combination of tobacco dust and calcium carbonate, equal parts by weight or 1 : 2 by measure, gives good results when applied to early-planted cabbage. The treatment should be made as soon as the plants are set, and after heavy rain it should be renewed or a little of the mixture should be placed close

around the stem of the plant. If the treatment is kept effective during the first two weeks after the plants are set out, they will then have passed the critical period, while the number of ovipositing flies will have passed its maximum. The protection afforded to radishes and turnips by this treatment is even more marked. Infusions that wash down into the soil through rain seem to have no definite effect upon the larvae. Larvae in contact with the mixture on the surface seem to be killed by it. Eggs laid in contact with the mixture are definitely affected, the mortality ranging as high as 100 per cent.

GARCIA (F.). [**Entomology.**]—*33rd Ann. Rept. New Mexico Agric. Expt. Sta., 1921–22,* pp. 14–22. State Coll., N.M. [1923]. [Received 22nd April 1924.]

In New Mexico *Epilachna corrupta,* Muls. (Mexican bean beetle) occurs only along chains of mountains. Beetles coming from the westward, down the wind, through a mountain pass, first appeared on 2nd June, and this migration increased steadily until the 28th, when the maximum was reached, declining gradually until 2nd July. During the autumn the prevailing wind is from the east, and apparently they travel back with the wind for hibernation in the mountains. Of many food-plants other than beans investigated, only lucerne was eaten immediately after emergence from hibernation, and a species of *Chenopodium* also served for food and oviposition. Of 30 varieties of indigenous plants offered, eggs were laid upon one plant that gave off an essential oil resembling the odour of a bean plant. In the sandy soil of the district no adults emerged after being buried deeper than ½ in. Experiments were made on jarring the trees and destroying the beetles knocked off. Of 157 beetles counted on a row of bean plants, 135 were caught in pans of oil dragged beneath the plants by a machine that jarred the trees at the same time. It was found impossible, however, to keep soil out of the pans, and therefore a mould-board was arranged to throw 1½ to 2 in. of earth upon the beetles lying on the ground after jarring. It was found that only 4 out of 15 extricated themselves between 19th June and 1st August, when the test was suspended. About 40 per cent. of the larvae were knocked down by jarring, but burial did not seem to destroy them as effectively as the adults. The majority would, however, probably perish before reaching the tree again owing to exposure on the hot ground. A parasite that had attacked the eggs a year before was not observed.

FITE (A. B.). **Summary of Codling Moth Investigations, with Spraying Schedules.**—*New Mexico Agric. Expt. Sta.*, Bull. 135, 24 pp., 7 figs. State Coll., N.M, February 1923. [Received 22nd April 1924.]

A summary is given of the life-history studies of the codling moth *Cydia* (*Carpocapsa*) *pomonella*, L., carried out in New Mexico from 1914 to 1919 [*cf. R. A. E.*, A, vii, 333; xi, 268], and suggestions are made for the practical application of the information obtained from them with regard to control. Curves are plotted to show the daily emergence of moths, deposition of eggs and hatching of larvae during those years. A spray schedule that has been worked out with regard to seasonal variations is given, with special ones for particularly susceptible varieties of apples and pears. The value of the calyx spray is discussed,

owing to the fact that in the western States a much smaller percentage of larvae enter through the calyx end than in the eastern States, where there are only two generations in a year; it has been decided to retain the spray, as the larvae usually begin to hatch just when it is given, and it serves as a cover as well as a calyx spray, making it possible to delay the first-generation spray. It should be given any time after 90 to 100 per cent. of the blossoms are off, and before the calyx closes; the second spray should be applied about 18 days later, the third 42 days after the second, and the fourth, fifth and sixth at intervals of 20 days, bringing the last to the 18th to 23rd of August. Certain modifications of the above are suggested to meet the requirements of other districts. Attention is called to the value of bands of dark cloth or burlap, folded three times, placed round the butt of the tree after the old bark is cleared off; a large proportion of the remaining larvae will pupate under them, and should be destroyed at ten-day intervals. The spray chiefly used has been 1½ lb. powdered lead arsenate to 50 U.S. gals. water; whether this is the best formula has not been tested, but it is believed that promptness and efficiency of application are the two most important factors in spray work. As the upper halves of tall trees are usually much more heavily infested than the lower, the tops of such trees should be sprayed from a tower.

Severin (H. P.). **Curly-leaf Transmission Experiments.**—*Phytopathology*, xiv, no. 2, pp. 80–93, 1 fig. Lancaster, Pa., February 1924.

Juice pressed from the leaves and roots of beets infected with curly-leaf and inoculated into the crown of healthy beets caused typical symptoms of the disease in 9 per cent. of the latter. The period from the date of inoculation until the earliest symptom developed varied from 12 to 39 days. Non-infective beet leaf-hoppers [*Eutettix tenella*], when allowed to feed on the inoculated beets after curly-leaf had developed, transmitted the disease to healthy beets, the earliest symptom appearing in from 2 to 13 days. The shortest time required for the infective principle to travel through a beet petiole seven inches long was half an hour at a mean temperature of 103·5°F. When infective beet leaf-hoppers were placed on a beet seedling to feed on the inner or youngest leaf, non-infective males placed on one of the outer or older leaves at the same time became infective at the end of two days. Infective beet leaf-hoppers retained their infectivity during all the nymphal stages, after each moult and during the entire adult life.

Hungerford (C. W.) & Raeder (J. M.). **Mosaic and Leaf-roll of Potatoes in Idaho.**—*Phytopathology*, xiv, no. 2, p. 123. Lancaster, Pa., February 1924.

Mosaic and leaf-roll are among the most important and destructive potato diseases in Idaho. There are at least three distinct types of mosaic in the State. The green and pink rose aphis [*Macrosiphum solanifolii*] is plentiful in the potato growing districts, and experiments have shown that it may transmit the russet dwarf type of mosaic under Idaho conditions.

McIndoo (N. E.) & Sievers (A. F.). **Plants tested for or reported to possess Insecticidal Properties.**—*U.S. Dept. Agric.*, Bull. 1201, 61 pp. Washington, D.C., 19th March 1924.

A catalogue of 260 plants that have been tested for insecticidal properties is given, with notes regarding their value in this connection.

The following, when properly prepared and used, are efficient against certain species of insects: *Chrysanthemum cinerariaefolium, C. coccineum* and *C. marschallii*, used for making pyrethrum powder; *Derris elliptica* and *D. uliginosa*; a Peruvian plant known locally as "cube" (the extracts of all the foregoing combined with soap are promising as contact insecticides and compete favourably with nicotine sulphate in efficiency and probably in cost); quassia (*Aeschrion excelsa*); amianthium (*Chrosperma muscaetoxicum*); common tobacco (*Nicotiana tabacum*); sabadilla (*Schoenocaulon officinale*); and white false hellebore (*Veratrum album*).

Several others have been reported as efficient by other authors, but of the rest most are not worth further consideration, though with regard to the poisonous plants, particularly the fish poisons found in the tropics or sub-tropics, the chances of obtaining other efficient insecticidal materials are very promising.

Worthley (H. N.). **The Control of the Squash Vine Borer in Massachusetts.**—*Massachusetts Agric. Expt. Sta.*, Bull. 218, pp. 70–80, 2 pls., 2 figs. Amherst, Mass., October 1923.

Melittia satyriniformis, Hb. (squash vine borer) is a serious pest of winter squashes and related plants. The adult moths fly during July and oviposit on squash plants, the larvae tunnelling the stem and girdling the plant, causing first a slight check in growth, then rotting of the stems and the loss of partly formed fruit, and finally sometimes the death of the plant. The larvae descend to the earth in autumn and spend the winter there, spinning a cocoon and pupating in the spring. The eggs are laid singly, generally on the main stem near the base, to the number of 150 to 200 per female, from late June to mid-August. Except for Asilids (robber flies) predacious on the adults, and Carabids occasionally attacking the larvae, the insect appears to have no natural enemies after hatching, but the eggs are parasitised to a high degree by a Scelionid, *Telenomus* (*Prophanurus*) sp. Cultural practices, such as autumn ploughing, fertilisation to encourage growth, and covering the runners with earth, are recommended, and also cutting the borers out from infested vines. Certain insecticides have been tried in the past and declared to be useless. Experiments described show that 1 part nicotine sulphate to 100 parts water kills over 97 per cent. of the eggs, and 1 part in 250 kills over 90 per cent. Spraying should be done four times at weekly intervals, beginning the first week in July, using the stronger dose with compressed air sprayers or similar machinery, and the weaker with barrel pumps or power sprayers. Extermination can be completed by cutting out the remaining borers during mid-August. The cost of the treatment is discussed.

Cory (E. N.) & Potts (S. F.). **The Control of Truck Crop Pests by Dusting.**—*Maryland Agric. Expt. Sta.*, Bull. 261, pp. 121–155, 17 figs. College Park, Md., February 1924.

Notes are given on the occurrence and habits of *Acyrthosiphon* (*Illinoia*) *pisi*, Kalt. (pea aphis) in Maryland, as well as details of

dusting experiments during 1922 and 1923. The results of the 1923 experiments confirm those of the previous year [*R. A. E.*, A, xi, 226]. The various factors influencing dusting, such as the time and method of application, apparatus used, condition of crop and meteorological conditions, are discussed with a view to obtaining the best results under any given circumstances.

Against *Aphis gossypii*, Glov. (melon aphis) one application of a 2 per cent. nicotine dust from a sulphate source used at the rate of 25 lb. to the acre, produced a mortality of almost 100 per cent. The yield and quality of the melons was considerably increased, and from 45 to 90 per cent. of the crop was saved in the dusted fields.

In dusting against *Halticus citri*, Ashm. (garden flea-hopper), part of the dust should be directed on the ground in order to reach those individuals that have been knocked off the plants. Fairly good results were obtained with a 2 per cent. dust as above, when used at the rate of 50 lb. to the acre. Calcium arsenate (25 per cent.) proved most effective against *Epilachna borealis*, F. (squash lady beetle); it should be applied to the lower surface of the leaves at the base of the plants, where the eggs are laid, at the time these begin to hatch. Further treatment should be given at 7 to 10 day intervals, beginning at the end of June.

A small box fumigator is described that is especially adapted for the treatment of pests of melons before the vines have begun to spread. With these boxes fumigation of a field can be done very rapidly at a low cost. Against *A. gossypii* only 4–6 lb. of calcium cyanide or 10–12 of nicotine dust are required per acre. The latter was also used against *Diabrotica vittata*, F. (cucumber beetle).

Against *Aphis rumicis*, L. (bean aphis), a 3 per cent. nicotine dust (sulphate source) at the rate of 40 lb. per acre is recommended, whilst against the asparagus beetles, *Crioceris asparagi*, Oliv., and *C. duodecimpunctata*, L., a 2 per cent. nicotine dust made from either a sulphate or a free nicotine source may be used. Young beds may thus be fully protected from the feeding of larvae and adults, and a certain amount of protection may be obtained in old beds if the dust is applied with a power duster and long trailer immediately after cutting.

ENGELHARDT (G. P.). **The Saturniid Moth, *Coloradia pandora*, a Menace to Pine Forests and a Source of Food to Indians in Eastern Oregon.**—*Bull. Brooklyn Ent. Soc.*, xix, no. 2, pp. 35–37. Brooklyn, N.Y., April 1924.

Coloradia pandora caused serious injury to forests of yellow pine [*Pinus ponderosa*] in eastern Oregon in 1923, big trees being principally subjected to attack. At the time of the investigation the larvae had disappeared, but numbers of pupae were found below the trees, though 50 per cent. had been killed by parasites or bacterial diseases. A large mortality of the fully-grown larvae was also indicated. The adults emerge in August or early September of the year following pupation. The eggs are laid in masses usually encircling the twigs and hatch in September, hibernation taking place in the larval stage. Pupation occurs in late June and during July. In years of heavy infestation the defoliation of the yellow pine would prove fatal if repeated in consecutive years; but there are long periods of rest and recovery. The pupae are roasted and pulverised by the Indians for food.

DAVIDSON (J.). **Factors which influence the Appearance of the Sexes in Plant Lice.**—*Science*, lix, no. 1529, p. 634. Garrison, N.Y., 18th April 1924.

Marcovitch [*R. A. E.*, A, xii, 118] appears to be of the opinion that it is the relative length of time that Aphids are exposed to daylight that is the important factor.

The author, believing that the light factor may be important in so far as it affects the photosynthetic activity of the plant, carried out an experiment in 1922 with colonies of a pure line of *Aphis rumicis*, L., reared on *Vicia faba*. The experiment was carried on from November 1922 to January 1923, artificial lighting being obtained from two 500 c.p. tungsten filament lamps. The Aphids were exposed to eight hours' illumination daily, beyond the ordinary hours of daylight. Control colonies only received the ordinary daylight. Temperature charts were kept throughout the experiment. Reproduction was fairly rapid, and practically all the Aphids produced were apterous agamic females.

An examination of the results indicates that temperature was an important factor in this experiment. The experiment was stopped on 15th January, and the Aphids were kept under normal daylight conditions at a lower temperature. Under these conditions sexual forms appeared in the generations from 10th February to 10th June, after which only agamic forms were produced. On 3rd October sexual forms again appeared. Sexual forms were obtained in the colonies, it will be noted, in early June, the evidence indicating that temperature was the factor concerned. In any case the hours of daylight were almost at the maximum. It is clear that the maximum agamic reproduction occurs over the favourable months of the year, and it seems highly probable that sunshine, temperature and length of day are influential factors.

GILLETTE (C. P.) & PALMER (M. A.). **New Colorado Lachnini.**—*Ann. Ent. Soc. Amer.*, xvii, no. 1, pp. 1–58, 2 figs., 13 pls. Columbus, Ohio, March 1924.

The new species described from Colorado are: *Anoecia graminis* on roots of grass and *Hordeum*, *A. setariae* on *Setaria*, *Essigella hoerneri* on *Pinus edulis*, *E. fusca* on *Pinus ponderosa*, *Lachnus sabinae* and *L. pulverulens* on *Sabina scopulorum*, *L. sibericae* on *Juniperus siberica*, *L. splendens* on *Pseudotsuga taxifolia*; *L. solitarius*, *L. glabra* and *L. ponderosae* on *Pinus ponderosa*; *L. terminalis* and *L. ater* on *Pinus edulis*; *L. hottesi* on *Picea engelmanni*; *L. similis*, *L. murrayanae* and *L. brevispinosus* on *Pinus contorta*; and *L. flexilis* and *L. apini* on *Apinus flexilis*.

LEIBY (R. W.) & HARRIS (J. A.). **Habits and Control of the Cotton Boll Weevil in North Carolina. (A Progress Report of its Life-history and Control made during 1923.)**—*Bull. N. Carolina Dept. Agric.*, 19 pp., 7 figs. Raleigh, N.C., March 1924.

Tests of remedies for the cotton boll weevil [*Anthonomus grandis*, Boh.] in North Carolina during 1923 indicate the advisability of giving one application of home-made poison consisting of 1 lb. calcium arsenate and 1 U.S. gal. each of molasses and water, just when the squares begin to form, the poison being applied to the buds with a

mop. It is considered that when 4 to 7 applications are mopped on the plants during the season (especially the fruiting time) the cost is as great as or greater than the value of the cotton gained by the treatment. The Florida method [*R.A.E.*, A, xi, 73; xii, 209] is not recommended for general adoption. It is recommended that the poisoning should be followed up by 4 to 7 applications of calcium arsenate dust, beginning when 10 per cent. of the squares are punctured, and continuing at intervals of 4 or 5 nights at the rate of 5 to 7 lb. of poison per acre. The dust should be driven into the squares, dead weevils frequently being found there afterwards.

McGehee (T. F.). **Preliminary Report on early poisoning in Boll Weevil Control.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, iii, no. 3, pp. 1–15, 3 figs. A. & M. College, Miss., October 1923.

The method of poisoning as a remedy for the cotton boll weevil [*Anthonomus grandis*, Boh.] recommended in this preliminary report is the application of calcium arsenate either in dust form or with molasses as a liquid to the terminal buds of young plants just before any squares form. Another application is made 10 days later, preferably of the dust, instead of waiting until 10 to 15 per cent. of the squares are punctured. This method has only been tested for one year, but is considered very promising. As both liquid and dust gave practically uniform results, where labour is cheap and the acreage small the liquid may be preferred, but in most cases the dust will be cheaper. If this method is used the fields should be closely watched during July and August, in readiness for a dust application of calcium arsenate if 10 per cent. of the squares become infested. This is particularly likely to occur if the fields are in the vicinity of untreated cotton, and points to the necessity for co-operative action. The advice of the nearest experiment station should be followed in regard to crop rotation, soil preparation, fertilisation, varieties, planting, spacing and cultivation.

Flint (W. P.), Chandler (S. C.) & Glenn (P. A.). **The Apple Flea-weevil, *Orchestes pallicornis*, Say (Order Coleoptera; Family Curculionidae).**—*Bull. Illinois Nat. Hist. Survey*, xv, art. 1, pp. 1–37, 16 figs. Urbana, Ill., January 1924.

As stated in the authors' footnote, this information on *Rhynchaenus* (*Orchestes*) *pallicornis* is substantially the same as that contained in a recent paper by J. S. Houser [*R.A.E.*, A, xii, 239], the data having been accumulated in Illinois and Ohio independently, though combined for publication.

Newcomer (E. J.), Yothers (M. A.) & Whitcomb (W. D.). **Control of the Codling Moth in the Pacific Northwest.**—*U.S. Dept. Agric.*, Farmers' Bull. 1326, 26 pp., 20 figs. Washington, D.C., March 1924.

The various stages of *Cydia* (*Carpocapsa*) *pomonella*, L. (codling moth), its life-history and habits and the nature of injury caused by it are described, details being also given of its seasonal history in the Pacific North West.

The relative value of various remedial measures that have been suggested is discussed, and instructions are given for the preparation and application of combination sprays against *C. pomonella*, powdery mildew and scab.

LEIBY (R. W.) & HARRIS (J. A.). **The Plum Curculio on Peaches and its Control.**—*N. Carolina Agric. Extens. Serv.*, Circ. 144, 16 pp., 11 figs. Raleigh, N.C., March 1924.

This account of the life-history and control of *Conotrachelus nenuphar* in North Carolina is in the main the same as one previously noticed [*R.A.E.*, A, xi, 263].

ALDRICH [J. M.]. *Braula coeca* **Nitzsch in Maryland Apiaries.**—*Jl. Washington Acad. Sci.*, xiv, no. 8, p. 181. Baltimore, Md., 19th April 1924.

Braula coeca, Nitzsch, the so-called bee-louse of Europe, has been found in large numbers in Maryland apiaries. This Dipteron has been imported on queens before, a single specimen at a time, but was not known to have become established. Apparently the insects, according to Dr. Phillips, do very little harm in the bee colony. They may congregate on queens, to which they are partial, but even this is rare.

HUBER (L. L.) & NEISWANDER (C. R.). **Questions concerning the European Corn Borer.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, ix, no. 1–2, pp. 3–8, 11 figs. Wooster, Ohio, January–February 1924.

This is a popular account of the bionomics of *Pyrausta nubilalis*, Hb. (European corn borer) arranged in the form of answers to the many queries received from Ohio maize growers. Remedial measures especially adapted to Ohio conditions are described.

A Report of the Director of the New Hampshire Agricultural Experiment Station for the Year 1923.—*New Hampshire Agric. Expt. Sta.*, Bull. 212, 38 pp. Durham, N.H., January 1924.

In the course of this report a brief account is given of recent work started in New Hampshire in connection with the European corn borer [*Pyrausta nubilalis*, Hb.] by W. C. O'Kane and P. R. Lowry. Infested material was secured in Massachusetts for the purpose of life-history studies under local conditions. Details are given of the seasonal history thus obtained, from which it is evident that in spite of the fact that spring activities begin later than in Massachusetts and that the development of the subsequent stages is delayed, two generations may be completed in the year at Durham. The work is being continued with material obtained from local infestations.

KEENAN (W. N.). **European Corn Borer in Ontario in 1923. Spread and Degree of Infestation.**—*Agric. Gaz. Canada*, xi, no. 2, pp. 126–130. Ottawa, March-April 1924.

The spread of the European corn borer [*Pyrausta nubilalis*, Hb.] in Ontario and the work done on it since 1920 are reviewed. At the beginning of the season of 1923 the area under quarantine in Ontario totalled 12,616 square miles, as compared with 13,857 in the United States. During a recent survey in Ontario 8 additional townships were found to be infested, the northern spread of the insect along Lake Huron indicating the relative importance of lake shore conditions in its distribution.

CRIDDLE (N.). **Notes on the Early Stages of Grasshoppers.**—*Canad. Ent.*, lvi, no. 3, pp. 49–53. Orillia, Ont., March 1924.

Several Canadian grasshoppers were bred by the author from eggs in order to study the immature stages. Breeding was done in two-quart fruit jars, placed near a steam radiator and kept in the sun as much as possible. Certain species, such as *Camnula pellucida*, require some care in feeding, but *Melanoplus* spp. are satisfied with almost any form of vegetation, *Tradescantia* being a particularly favoured food-plant of the younger nymphs.

A close similarity has been found to exist in the development of most of the OEDIPODINAE and CATANTOPINAE (LOCUSTINAE), all having, probably, five moults and the characters of the various stages appearing to be fairly consistent. On the whole, the OEDIPODINAE are more variable than the CATANTOPINAE, and characters apparently stable in the latter differ considerably in the former. In the OEDIPODINAE there is a marked difference in colouration of the first instar compared with the succeeding ones, and the markings frequently provide a colour pattern that is strikingly different from that of allied genera and probably species. The CATANTOPINAE, on the other hand, are alike in colour throughout their life, and the differences between species are less marked.

The number of antennal joints has been found a particularly good character for separating different stages of *Melanoplus*. Eggs of different species may be separated by their pattern and colour. Descriptions of the eggs and different stages of the larvae are given for the following species: *Camnula pellucida*, Scudd., *Mestobregma kiowa*, Thom., *Spharagemon collare*, Scudd., *Melanoplus confusus*, Scudd., *M. angustipennis*, Dodge, *M. packardi*, Scudd., *M. atlantis*, Riley, *M. luridus*, Dodge, and *M. bivittatus*, Say.

VIERECK (H. L.). **Descriptions of new reared Hymenoptera from Nova Scotia and British Columbia.**—*Canad. Ent.*, lvi, no. 3, pp. 64–69, 1 fig. Orillia, Ont., March 1924.

The species dealt with include: *Ephialtes cacoeciae*, sp. n., reared from *Tortrix* (*Cacoecia*) *argyrospila* and *T.* (*C.*) *rosana*, *Phaeogenes cacoeciae*, sp. n., from *T. argyrospila* (pupa), and *Campoplex* (*Angitia*) *basizona*, sp. n., and *C.* (*A.*) *cacoeciae*, sp. n., from *T. rosana*, in British Columbia; and *C.* (*A.*) *rosanae*, sp. n., from *T. rosana*, in Nova Scotia.

SWAINE (J. M.). **The Allies of *Ips confusus* Lec. in Western America. Family Ipidae, Coleoptera.**—*Canad. Ent.*, lvi, no. 3, pp. 69–72. Orillia, Ont., March 1924.

There are at least four species of *Ips* belonging to the *confusus* group from the Rocky Mountains and Pacific Coast regions of North America. The species originally described by Leconte as *Ips confusus* from California is selected as type, and a description of the adult is given. This species is represented from various localities in California and Oregon taken in *Pinus ponderosa* and *P. lambertiana*.

The Arizona specimen of *I. confusus* in the Leconte collection is described as a new species under the name *I. lecontei*, another one being *I. cloudcrofti*. The necessary changes in an earlier key to the genus *Ips* [*R.A.E.*, A, vii, 67] are given.

GIBSON (A.). **The Occurrence of the Ptinid Beetle, *Niptus hololeucus*, Fald., in North America.**—*Canad. Ent.*, lvi, no. 4, pp. 74–76. Orillia, Ont., April 1924.

In March 1923, *Niptus hololeucus* was found in numbers in consignments of imported woollen goods in Ontario. Very little damage was being done, but there was definite indication of injury. The previous history of this Ptinid in North America is briefly reviewed.

TREHERNE (R. C.). **Thysanoptera known to occur in Canada.**—*Canad. Ent.*, lvi, no. 4, pp. 82–88, 1 fig. Orillia, Ont., April 1924.

In this list of Thysanoptera known in Canada the following are described as new from British Columbia: *Frankliniella nubila* from *Casiope*, a moss heather, *Taeniothrips orionis* from mountain lupin, and *T. lemanis* from buds of *Acer macrophyllum*. In the time of the year it occurs and from its habitat *T. lemanis* resembles the pear thrips, *T. inconsequens*, Uzel.

Cotton Protection Ordinance, 1924.—6 pp. Kingstown, St. Vincent, 7th March 1924.

This is an adaptation of the Cotton Protection Ordinance, 1923 [*R.A.E.*, A, xi, 522], which is repealed. The chief modifications are that the destruction of cotton plants by the first day of the close season must be carried out by burning and that the Governor has power to make regulations for the control of cotton ginneries, the fumigation and disinfection of seed, the transport and storage of cotton seed and containers, and the disposal of seed, etc., seized for contravention of this Ordinance.

Regulations under the Cotton Protection Ordinance, 1924.—2 pp. Kingstown, St. Vincent, 8th March 1924.

These regulations provide for the ginning of seed-cotton, the cleansing of cotton houses, the treatment and fumigation of seed and containers, the registration of ginneries, the disposal of any cotton seized, the transport of seed, and the powers of the Agricultural Department. The presence of the cotton stainer, *Dysdercus delauneyi*, on any land must be reported to the Agricultural Superintendent and measures taken for its destruction.

ALLDER (C. T.). **Insectes et maladies.**—*Cinquième Rapp. Sta. agron. Guadeloupe, 1922–23*, pp. 16–17. Pointe-a-Pitre, 1924.

Diatraea saccharalis is the cause of considerable loss to sugar-cane growers in Guadaloupe. It is difficult to get the planters to undertake remedial measures, which include dipping the plants in Bordeaux mixture, and cutting out and burning the dead stalks before the base has rotted away, for the larva then leaves it to attack a fresh one. *Pseudococcus calceolariae* has been observed on sugar-cane, but is not a serious pest.

Gowdey (C. C.). **Citrus Cultivation.**—*Jamaica Dept. Agric.*, Ent. Circ. 10, 10 pp. Kingston, 1924.

In the course of this paper the insect pests of *Citrus* in Jamaica are briefly discussed, those causing most injury being *Chionaspis citri* (orange snow scale), which attacks the larger branches, *Lepidosaphes beckii* (purple scale), found on the branches, twigs and fruit, *Selenaspidus articulatus*, attacking the foliage and fruit, and *Aleurocanthus woglumi* (citrus black fly). For fuller information the reader is referred to a previous bulletin [*R.A.E.*, A, xii, 235].

Wolcott (G. N.). **Insectae Portoricensis** [*sic*]. **A Preliminary Annotated Check-list of the Insects of Porto Rico with Descriptions of some new Species.**—*Jl. Dept. Agric. Porto Rico*, vii (1923), no. 1, pp. 1–313, 2 pls. Rio Piedras, P.R., 5th March 1924.

An attempt is made to summarise the records in literature of the occurrence of insects in Porto Rico. A bibliography of the general and economic papers dealing with insects of several orders is given separately, while the larger systematic and descriptive papers are given under the Orders.

Thirty-two new species are described, including *Chalcis robustella*, a parasite of *Remigia punctularis*, Hb. (*repanda*, F.) and other moths; *Spilochalcis cocois* and *S. homaledrae* from coconut leaves infested with *Homaledra sabalella*, Chamb.: *Tetrastichus vaquitarum* from eggs of *Lachnopus coffeae*, Mshl.; *Lachnosterna* (*Phyllophaga*) *crinitissima*; a weevil, *Compsus maricao*, ovipositing on coffee leaves; and the Jassids, *Agallia pulchra*, *Chlorotettix bidentatus*, *Cicadula maidis*, *Eugnathodus bisinuatus* and *E. guajanae* on sugar-cane, and *Empoasca brevidens* on coffee.

Bondar (G.). **Os insectos damninhos. xxxii. Uma broca do mamoeiro,** *Piazurus papayanus*, **Marshall, nova especie.** [Injurious Insects. xxxii. A new Species of Papaw Borer, *P. papayanus*, Marshall.]—*Chacaras e Quintaes*, xxix, no. 3, p. 223, 1 fig. S. Paulo, 15th March 1924.

The branches and trunks of papaw trees [*Carica papaya*] in Brazil are mined by a recently described weevil, *Piazurus papayanus*, Mshl. [*R.A.E.*, A, x, 391]. The infestation is revealed by the frass adhering to the trunk. The tree may be killed. Pupation occurs within the tree. Old or sickly trees are preferred, and large numbers of the weevils occur in broken or recently felled papaw trees. Old trees should be felled, and about a fortnight later, when heavily infested, they should be split and exposed to poultry or pigs. Alternatively such timber may be buried about 8 inches deep. Standing trees should be inspected, and any larvae traced by their frass should be extracted.

de Azevedo Marques (L. A.). **As pragas da batata doce. A "cassida de 6 manchas,"** *Neomphalia sexpustulata*, **Fabricius** [Sweet Potato Pests. The Six-spotted Cassid, *N. sexpustulata*.]—*Chacaras e Quintaes*, xxix, no. 3, pp. 229–230, 1 fig. S. Paulo, 15th March 1924.

In the State of Rio de Janeiro the larva and adult of the Cassid beetle, *Neomphalia sexpustulata*, F., feed on the foliage of sweet potato, causing serious injury. The female lays about 800 eggs, and

the larvae hatch after about 6 days. The pupal stage lasts 10 days. Collection of the eggs, larvae and adults is advised, or the plants may be sprayed with a solution containing 1 lb. Paris green and 2 lb. flour in 50 gals. water.

BONDAR (G.). **Uma nova doença do algodoeiro produzida por** *Eriophyes gossypii*, **Banks.** [A new Disease of Cotton Plants due to *E. gossypii*.]—*Correio-Agricola*, ii, no. 3, pp. 78–80, 2 figs. Bahia, March 1924.

In the Brazilian State of Bahia the foliage of cotton plants is attacked by a mite, *Eriophyes gossypii*, Banks, the leaves being covered with galls. Remedial measures are difficult to apply, as no spray can reach the mites in their galls. Infested plants are best left until the harvest, though their yield may be diminished. All cotton stems, etc., should be burnt before replanting, and the seed for sowing should be disinfected with carbon bisulphide.

ROLFS (P. H.). **Como prevenir e combater a destruição de sementes por insectos.** [How to prevent and combat the Destruction of Seeds by Insects.]—*A Lavoura*, xxviii, no. 2, pp. 56–63, 1 fig. Rio de Janeiro, February 1924.

This article describes briefly the usual methods of seed disinfection by heat and by fumigation with carbon bisulphide or hydrocyanic acid gas.

WIMSHURST (F. M.). **A New British Aphid.**—*Ent. Mo. Mag.*, lx, pp. 62–63. London, March 1924.

Macrosiphum galiophagum, sp. n., is described from Kent, where it was taken on goosegrass (*Galium aparine*). By the beginning of August no more Aphids were found on goosegrass in the hedgerows, but several had established themselves on plants that had been potted and brought indoors, where they continued breeding freely until the end of October.

WIMSHURST (F. M.). *Myzus cerasi* **F. on** *Galium aparine* **and afterwards on protected Plants.**—*Ent. Mo. Mag.*, lx, p. 65. London, March 1924.

Myzus cerasi has been found breeding freely on goosegrass (*Galium aparine*) in the field during July and August and on protected plants up to October, but further work is required to prove whether this is a normal alternative food-plant of this species.

LEES (A. H.). **Egg-killing Washes.**—*Jl. Pomology & Hort. Sci.*, iii, no. 4, pp. 174–178. London, 1924.

The experiments previously described [*R.A.E.*, A, xi, 538] have been continued. Separate tables are given showing the effects on eggs of *Aphis pomi* of three different groups of insecticides, namely, sulphur, nicotine-soda, and coal-tar. It was found that lime-sulphur alone in any strength was ineffective, but with the addition of 0·2 per cent. calcium caseinate it had a strong killing action at the strengths of 1 in 15, 1 in 20 and 1 in 30, whether applied in February or March.

Other fluids releasing or containing finely divided sulphur or sulphur dioxide were comparatively ineffective. Combinations of caustic soda and nicotine had strong killing power if applied just before hatching, but were useless at an earlier date. Certain of the coal-tar products were toxic, but most of them were inoperative and some damaged the plant.

Dubois (P.). **Contre les insectes nuisibles aux oeillets.**—*La Vie agric. & rur.*, xxiv, no. 15, p. 238. Paris, 12th April 1924.

Thrips are very troublesome to the carnation growers of the Côte d'Azur, particularly two species, one of which is black and the other a very pale colour. They creep into the centre of the buds, biting the base of the leaves and hindering their growth. The leaves turn yellow and are frequently infected with mildew through the punctures. The thrips are very resistant to most insecticides; the larvae survive prolonged immersion in water, and the adults were found alive after several hours' immersion in kerosene. Of all the remedies tried nicotine proved by far the most successful, the formula recommended being 1 gal. 10% nicotine with 10 lb. soft soap to 100 gals. of water. The first treatment must be made to the seedlings before planting out, in April or May; the second after they are established in the ground (May), and afterwards every 8 or 10 days until September, according to the season. Infestation is noticeably less severe in cool, moist weather. The nicotine sprays should be applied as late as possible in the evening. Wild flowers in the neighbourhood and seedlings should be destroyed during the winter. The first carnation flowers are always pinched off, and these should be burnt in order to destroy the fertilised females that they contain. All the flowers remaining at the end of the season should be removed, otherwise the females will leave them to attack the young slips for the next crop, which are already in the ground; it is then that the insects are most dangerous.

Truelle (A.). **La destruction de l'anthonome en Angleterre et en Suisse.**—*La Vie agric. & rur.*, xxiv, no. 17, pp. 267–268. Paris, 26th April 1924.

This is a review of the work done in Switzerland and England against the apple weevil [*Anthonomus pomorum*] [*R.A.E.*, A, viii, 522; x, 607, 608; xi, 424].

Seyrig (A.). **Observations sur la biologie des Ichneumons.**—*Ann. Soc. ent. France*, xcii (1923), no. 4, pp. 345–362. Paris, 1924.

Woodboring insects as well as their Ichneumonid parasites have been increasing enormously on the French frontiers in the War Zone, where dead and dying trees have been neglected in the devastated areas, particularly in certain localities of the Vosges and of Lorraine. Notes are given on the species collected, and a list is given of the specific parasites of the Cerambycids, *Rhagium inquisitor*, L., and *Callidium sanguineum*, L. These parasites do not seem to be very efficacious. One oak log on which 128 parasites in various stages were found contained from 800 to 1,000 adults of *C. sanguineum*, so that 80 per cent. of the beetles had reached the adult stage without being attacked. The hibernation of Ichneumonids is discussed, and a table records many species with different types of hibernation quarters.

Gautier (C.) & Bonnamour (S.). **Description d'une espèce nouvelle de** *Trioxys* **(Hym. Braconidae, Aphidiinae).**—*Bull. Soc. ent. France,* 1924, no. 3, pp. 43–44. Paris, 1924.

The Braconid, *Trioxys pulcher,* sp. n., was taken at Saint-Genis-Laval, Rhône, in July. It is a parasite of a very small Aphid living on oak.

Grassé (P. P.). **Notes sur quelques Orthoptères français. II. Le cycle annuel des Acridiens.**—*Bull. Soc. ent. France,* 1924, no. 3, pp. 45–47. Paris, 1924.

The author distinguishes four different types of the annual life-cycle of French Acrididae. The most frequent is that of which *Calliptamus italicus* may serve as an example ; eggs are laid in summer and hibernate in the soil ; larvae emerge in spring and the postembryonic development takes about 3–4 months (sometimes 6). The second type is that of *Anacridium aegyptium,* which becomes adult in September or October and hibernates. The eggs are laid in spring and hatch in summer. *Pyrgomorpha conica* has a life-cycle of the third type ; it hibernates as a larva and attains maturity in spring ; the eggs hatch in autumn. The life-cycle of *Locusta migratoria* ph. *danica* belongs to a special, fourth, type, as it has, apparently, two generations a year. Certain individuals of *Calliptamus italicus* and of other species may occasionally deviate from the life-cycle typical for the species.

Poutiers (R.). **Un ennemi de l'Olivier au Japon,** *Hylobius perforatus,* **Roel. (Col. Curculionidae.)**—*Bull. Soc. ent. France,* 1924, no. 3, pp. 47–48. Paris, 1924.

An attempt is being made to introduce olive culture into Japan, but the olive trees in the Experiment Station at Takamatsu are severely attacked by a weevil, *Hylobius perforatus,* Roel., which constructs galleries widening out from the inner bark to the sapwood, sometimes completely girdling the branches until they are killed. It is not known what damage is caused by the adults, but in the case of the allied species, *H. abietis,* L., on pines, it is the adult that does the greatest injury. Apparently, *H. perforatus* has occured for some time in Japan on conifers.

Feytaud (J.). **Le Termite de Saintonge.**—*C.R. hebdom. Acad. Sci.,* clxxviii, no. 2, pp. 241–244. Paris, 1924.

A termite occurs in Charente-Inférieure that differs from that of the Landes, *Reticulitermes lucifugus,* Rossi, and was probably introduced from North America at the ports of Aunis and Saintonge towards the end of the eighteenth century. It is very near *R. flavipes,* Kollar.

Paillot (A.). **Sur deux Bactéries parasites des larves de** *Neurotoma nemoralis.*—*C. R. hebdom. Acad. Sci.,* clxxviii, no. 2, pp. 246–249, 1 fig. Paris, 1924.

The bacteria dealt with are *Bacillus neurotomae,* sp. n., and *Micrococcus neurotomae,* sp. n. They were isolated from larvae of *Neurotoma nemoralis,* but are not considered of any practical importance in

checking their numbers. Larvae of *Euxoa* (*Agrotis*) *segetum* and *A. pronuba* inoculated with *B. neurotomae* are infected without other reaction than phagocytosis; the larvae of *Neurotoma nemoralis* are also infected, but the transformation can be observed of certain bacilli into huge masses, which then degenerate. *Micrococcus neurotomae* is in general little virulent for insects; it multiplies more quickly, however, and does not provoke a more intense phagocytosis. It is often the cause of humoral reactions that are shown by the bacteriolysis of the bacilli or their transformation into rounded masses, which then degenerate. These facts support the theory of the author of the importance of humoral reactions in regard to the natural immunity of insects.

Lwoff (A.). **Infection expérimentale à** *Glaucoma piriformis* (**infusoire**) **chez** *Galleria mellonella* (**lépidoptère**).—*C.R. hebdom. Acad. Sci.*, clxxviii, no. 13, pp. 1106–1108. Paris, 1924.

Caterpillars of *Galleria mellonella* inoculated with a culture of *Glaucoma piriformis* were found to die in 8–15 days according to the numbers of infusoria introduced. Rapid multiplication of ciliates in the blood could be observed. Shortly before death occurred the blood of the larvae contained no leucocytes, which are numerous under normal conditions, but only large quantities of infusoria, which took complete possession of the body of the insects.

Rabaté (—). **La lutte contre le Doryphora de la pomme de terre en 1923.**—*C.R. Acad. agric. France*, x, no. 13, pp. 448–450. Paris, 1924.

A brief review is given of the situation with regard to the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in Gironde and of the success of the campaign against it, which has been largely due to co-operation among all those interested.

Feytaud (J.). **Les causes naturelles de destruction de l'Eudémis et de la Cochylis.**—*Rev. Zool. agric. & appl.*, xxii, no. 12, pp. 335–340. Bordeaux, December 1923.

Besides the artificial remedies practised against the vine moths [*Clysia ambiguella* and *Polychrosis botrana*] there are certain external factors that greatly influence their abundance. Cold seems to have very little effect on the pupae, but the heat of summer, with exposure to the sun combined with dryness, kills eggs, larvae and pupae, and even the moths, which are active under the moister conditions accompanying darkness. The factor of dryness is more powerful in summer than that of temperature, while humidity acts more or less directly on the larvae and pupae in autumn and winter by encouraging entomophytous fungi, such as *Botrytis bassiana* and *Isaria farinosa* var. *verticilloides*. These spores do not germinate in a dry medium; in the laboratory infection was readily produced with larvae and pupae in a moist atmosphere, but results in the field were not so good. It is thought, however, that the artificial cultivation and dissemination of such fungi would be practicable. During 1921–22, as many as 70 per cent. of mummified individuals of *P. botrana* were found dead from this cause. Experience has shown that earthing up the vine-stocks

increases the action of the fungi. This autumn cultivation should certainly be practised while means of disseminating the fungi are being worked out.

VILLENEUVE (J.). **Contribution à la classification des Tachinidae paléarctiques.**— *Ann. Sci. Nat. Zool.*, ser. 10, vii, no. 1–2, pp. 5–39, 7 figs. Paris, April 1924.

The generally accepted classification of Palaearctic Tachinids is discussed, and various modifications are suggested. The paper concludes with an outline of a new classification that, in the author's opinion, might be advantageously substituted for the present one.

TRINCHIERI (G.). **La lutte contre la Mouche de l'Olive en Toscane au cours de 1923.**— *Inst. Internat. d'Agriculture*, 5 pp. Rome, 20th January 1924.

The olive-growers' syndicate of Tuscany adopts the Berlese method of partial spraying against *Dacus oleae* (olive fly), three applications having been given during 1922 and three in 1923. The first spray, to be successful, must be made before the olives have grown sufficiently large to attract the fly for oviposition, the exact moment varying according to the region, situation of the olive plantation, climatic conditions of the year, etc. The Berlese spray consists of 90 gals. of water into which are mixed 100 lb. of molasses and 2½ to 3 lb. sodium arsenite, and the method is to spray only a part of the tree, generally that exposed to the east and getting the most sunshine. In 1923 the season was undoubtedly a favourable one for the fly, but in cases where the spray had been used over large areas together and at the right moment it was effectively controlled. Although the fly was not completely destroyed in the infested zones, the damage was negligible compared with the losses sustained before the general campaign was undertaken. The question of the development of sooty fungus as a result of using molasses-arsenical sprays is discussed, but when the method described above was followed, none was found to occur.

MENZEL (R.). **Ueber die Verbreitung von *Rhabditis*-Larven durch Dipteren.** [The Distribution of *Rhabditis* Larvae by Diptera.]— *Zool. Anz.*, lviii, no. 11–12, pp. 345–348. Leipzig, 5th March 1924.

Experimenting with *Rhabditis* larvae in bats' dung the author confirms conclusions reached by Aubertot [*R.A.E.*, A, xi, 338] as to the dissemination of the larvae by flies to which they become attached.

MIESTINGER (K.) **Bericht über die im Jahre 1923 zur Bekämpfung der beiden Traubenwickler und des Springwurmes durchgeführten Versuche.** [Report on the Experiments made in 1923 for combating the two Vine-moths and *Sparganothis pilleriana*.]— *Allgem. Weinztg.*, 1924, nos. 6 & 7, reprint, 5 pp. Vienna, 25th March & 1st April 1924.

In these experiments the arsenical known as Dr. Sturm's preparation proved superior to Urania green against the vine-moths, *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff., its superiority being due probably to the fact that it is dusted on the grapes and not sprayed,

so that a more uniform covering is attained. Both insecticides proved more effective against the first generation of the moths than against the second. In the latter case the variety of vine also influences the result, which is hindered by very abundant foliage and by closeness of the grapes.

Dr. Sturm's preparation gave negative results against *Sparganothis pilleriana*, Schiff., on Riparia vines, probably because the leaf-buds remain closed for a long period. With other varieties with more rapidly developing leaves the infestation was decreased by dusting with this insecticide.

HENGL (F.). **Vergleichende Versuche gegen verschiedene Rebenschädlinge.** [Comparative Experiments against various Vine Pests.]—*Allgem. Weinztg.*, 1923, no. 2, reprint, 6 pp. Vienna, 11th January 1923.

HENGL (F.) **Vergleichende Versuche des Jahres 1923 gegen verschiedene Rebenschädlinge.** [Comparative Experiments in 1923 against various Vine Pests.]—*Allgem. Weinztg.*, 1924, nos. 4 & 5, reprint. 6 pp. Vienna, 25th February & 10th March 1924.

Experiments made in 1922 with Solbar showed this preparation to be equal in effectiveness to the lime-sulphur mixture hitherto used in Austria against mites infesting the grape-vine. For winter treatment a 3 or 5 per cent. solution is either painted on or sprayed, while a strength of 1 per cent. is used for summer treatment against the second generation of mites.

In 1923 the above results were confirmed as the outcome of further tests.

WILKE (S.). **Die graue Gerstenminierfliege,** *Hydrellia griseola* **Fall. (Dipt. Ephydr.).**—*Deutsche ent. Zeitschr.*, 1924, pt. 2, pp. 172–178. Berlin, 15th April 1924.

During the summer of 1923 *Hydrellia griseola*, Fall., occurred in abundance over large areas in the Baltic Provinces on barley and oats, in some cases as much as 50 per cent. of the crops being destroyed. In this paper an attempt is made to summarise some of the less well known literature concerning this fly in various countries.

HABERMEHL (H.). **Beitrag zur Kenntnis der primären und sekundären Schmarotzerwespen der Kieferneule** (*Panolis flammea* **Schiff.** = *P. griseovariegata* **Goeze**). **(Hym.)** [Contribution to the Knowledge of Primary and Secondary Parasites of *P. flammea*.]—*Deutsche ent. Zeitschr.*, 1924, pt. 2, pp. 183–184. Berlin, 15th April 1924.

This list includes 17 species of primary parasites and 17 hyperparasites reared from the pupae of *Panolis flammea*, Schiff., in Bavaria. The hyperparasites include 6 species from the cocoons of *Banchus femoralis*, Thoms., 1 from the cocoons of *Henicospilus merdarius*, Grav., and 10 from the pupae of *Panzeria* (*Ernestia*) *rudis*, Fall.

Hedicke (H.) & Hering (M.). **Vorschläge für eine Terminologie der Blattminen.** [Suggestions for a Terminology of Leaf-mines.]—*Deutsche ent. Zeitschr.*, 1924, pt. 2, pp. 185–194, 13 figs. Berlin, 15th April 1924.

The importance of adopting a uniform nomenclature of the various insect mines in plants is pointed out, and suggestions are made for the classification of these, both according to their character and the part of plants attacked, as well as according to the group of insects responsible.

Baer (W.). **Beiträge zur Lebensweise der Nonne und Versuche mit deren Bekämpfung.** [Contributions to the Life-history of the Nun Moth and Experiments in its Control.]—*Tharandter Forstl. Jahrb.*, lxxiv, no. 5, pp. 240–247. Berlin, 1923. [Received 23rd April 1924.]

Observations on the nun moth [*Liparis monacha*] show that mating can take place about 10 hours after emergence. Oviposition has been noted about 24 hours later. If the females are killed when 1½ days old, some eggs may have been laid already. The males can fertilise more than one female, and as the females remain capable of being fertilised for more than a week, it is probable that few females remain unfertilised in nature even if the males are destroyed in large numbers. Eggs that were kept indoors and thus sheltered from winter cold yielded larvae from mid-January onwards, but not earlier. On spruce the larvae are known to feed on the opening buds, as they cannot penetrate the hard surface of old needles. In an experiment with pine needles some 400 larvae died when the only buds available were still tightly enclosed in the red-brown scales. The larvae on pines seem thus dependent on the opening of the young buds, just as with spruce. It might therefore be assumed that if the larvae hatch early or if the spruce trees are late there must be a large mortality among the larvae. Tests have shown, however, that they can go without food for 3 weeks. Caterpillars exposed to a sun temperature of 40°–52°C. [118·4°–125·6°F] died in a few minutes, so that there seem some grounds for the belief that excessive sunshine is the chief cause of their migration. The Tachinid parasite, *Zenillia libatrix*, Pz., not previously recorded from this host, was bred from it in 1922 in Saxony.

The application by means of a sponge of a 3–5 per cent. carbolic solution to the masses of young larvae has the advantage of rapidly wetting the bark and of not blowing some individuals away, as occurs with pressure sprayers. A solution of 1 per cent. lead arsenate paste is useful for protecting young spruce stands growing among older trees.

Escherich (K.). **Aufgaben der Forstentomologie.** [The Tasks of Forest Entomology.]—*Allgem. Forst- u. Jagdztg.*, c, reprint, 4 pp., January 1924. [Received 28th April 1924.]

Among the problems in forest entomology that have not as yet been worked out satisfactorily, investigation of the causes of outbreaks of pests is the most urgent matter for study. It is pointed out that direct measures against pests by the use of chemicals, etc., are less applicable in forestry than in agriculture, and that the chief aim of forest entomologists must be to take advantage of all forms of biological control.

SCHILLE (F.). **Häufigkeit und Schädlichkeit des Eichenspinners,** *Lasiocampa quercus* **L.** [The Frequency and Injuriousness of *L. quercus*.]—*Zeitschr. wiss. Insektenbiol.*, xix, no. 4, pp. 102–103. Berlin, 25th April 1924.

Referring to a paper by Krausse under the above title [*R. A. E.*, A, ix, 40] the author, as a result of 50 years' forestry experience, agrees that *Lasiocampa quercus*, L., is not a moth of economic importance in forests in Central Europe.

[UVAROV (B. P.).] **Уваров (Б.П.). Основные проблемы экологии вредных саранчевых.** [The fundamental Problems of the Ecology of injurious Grasshoppers.]—**Извест. Сибирск. Энтомол. Бюро** [*Bull. Siberian Ent. Bur.*], no. 3, pp. 7–18. Petrograd, February 1924.

Further improvements are necessary in the control of locusts and grasshoppers by poison, especially with poisoned baits. It must, however, be always borne in mind that this method cannot be more than a palliative, and research should be directed towards possible methods of preventing outbreaks. A detailed study of the ecology of injurious species may supply a knowledge of the factors regulating outbreaks and may suggest means of counteracting favourable natural conditions by agricultural practices. A brief outline of the aims and methods of such research is given, and the main problems in the ecology of Russian injurious locusts and grasshoppers are outlined.

[ANTONOV (N. V.).] **Антонов (Н. В.). Очередные задачи по борьбе с вредителями сельского хозяйства в Сибири на 1924 г.** [The Control of Agricultural Pests during 1924 in Siberia.]—**Извест. Сибирск. Энтомол. Бюро** [*Bull. Siberian Ent. Bur.*], no. 3, pp. 48–52. Petrograd, February 1924.

Though locusts are the most serious pests of agriculture in Siberia, various other insects, such as wireworms, flea-beetles and webworms, cause considerable damage. The extent of previous work for the control of locusts is very briefly reviewed. The infested area for 1924 is estimated at 113,400 acres, as compared with 302,400 in the previous year.

[BEREZHKOV (R. P.).] **Бережков (Р. П.). Краткий обзор работ Томской Станции Защиты Растений.** [Brief Review of the Work of the Tomsk Station for Plant Protection.]—**Извест. Сибирск. Энтомол. Бюро** [*Bull. Siberian Ent. Bur.*], no. 3, pp. 53–60. Petrograd, February 1924.

The organisation of the work of the Tomsk Station is outlined. The greater part of it has been directed against locusts, among which *Stauroderus scalaris*, Fisch. (*Stenobothrus morio*, F.) was particularly injurious in 1922. A Proctotrupid has been found parasitising from 5 to 20 per cent. of the eggs of this species in certain localities, and observations on its life-history are being made. *S. scalaris* is the most prevalent species in wooded regions, whereas in the steppe regions *Gomphocerus sibiricus*, L., appears to be most abundant. Other less important species are *S. apricarius*, L., and *Arcyptera flavicosta*, Fisch.

It has not yet been possible to compile a complete list of agricultural pests, but they include *Eurydema oleraceum*, L., *Athalia colibri*, Christ (*spinarum*, F.), *Meligethes aeneus*, F., *Barathra* (*Mamestra*) *brassicae*, L., and *Plutella maculipennis*, Curt.

[Shapinski (D. V.).] **Шапинский (Д.В.). Заметка о жуках рода *Mylabris* F.** [A Note on Beetles of the genus *Mylabris*.]—**Извест. Сибирск. Энтомол. Бюро** [*Bull. Siberian Ent. Bur.*], no. 3, pp. 61–65. Petrograd, February 1924.

As a result of investigations of breeding grounds in Uralsk a great invasion of locusts was expected in the spring of 1915, but their numbers were greatly reduced by various species of *Mylabris*, which became so abundant and caused such serious injury to potatoes, peas and cruciferous crops, that spraying with Paris green had to be applied against them. The most abundant species was *M. quatuordecimpunctata*, Pall., others being *M. decempunctata*, Pall., *M. callida*, Pall., *M. polymorpha*, Pall., *M. quadripunctata*, L., *M. variabilis*, Pall., and *M. sericea*, Pall.

[Raevski (V. G.).] **Раевский (В.Г.). Работы по изучению вредителей сельского хозяйства в Оренбургско-Киргизском районе в 1923 г.** [Studies in connection with Agricultural Pests in the Orenburg-Kirgiz Region in 1923.]—**Извест. Сибирск. Энтомол. Бюро** [*Bull. Siberian Ent. Bur.*], no. 3, pp. 66–67. Petrograd, February 1924.

The various insect pests studied during 1923 include many species of locusts as well as *Entomoscelis adonidis*, Pall., *Malacosoma castrensis*, L., *Aporia crataegi*, L., *Porthetria* (*Lymantria*) *dispar*, L., *Pteronus ribesii*, Scop. (*Nematus ventricosus*, L.) and *Eurydema ornatum*, L.

[Martynov (A. V.).] **Мартынов (А. В.). Практическая Энтомология. Руководство к практическим занятиям по Энтомологии (курс высших учебных заведений).** [Practical Entomology. Handbook of Practical Studies in Entomology (Course for advanced Educational Institutions).]—**Государственное Издательство** [*Govt. Pubn.*], pt. 5, 8vo., iv+388 pp., 248 figs., 1 map. Petrograd, 1924.

This part is devoted to the study of Trichoptera, which are dealt with on the same lines as those adopted in the previous instalment of this work [*R. A. E.*, A, xii, 138].

[Nikolski (V. V.).] **Никольский (В. В.). Саранчевая опасность.** [The Locust Danger.]—**Хлопковое Дело** [*Cotton Indust.*], [i], no. 5–6, pp. 16–19. Moscow, May-June 1922. [Received 2nd May 1924.]

A brief statement is made of conditions relating to locusts in different parts of Russia, mainly in Turkestan, in the spring of 1922 and of the preparations for an anti-locust campaign. Successful organisation of control is, in the author's opinion, possible only when the State entomological institutions closely co-operate with those interested in the cotton industry, which suffers severely from locusts in Turkestan.

[Siyazov (M. M.).] **Сиязов (М.М.). Положение с саранчей в Самаркандской области.** [The Locust Conditions in the Samarkand Province.]—**Хлопковое Дело** [*Cotton Indust.*], [i], no. 7–8, pp. 112–114. Moscow, July–August 1922. [Received 2nd May 1924.]

The Moroccan locust [*Dociostaurus maroccanus*, Thnbg.] was not expected in dangerous numbers, but a severe outbreak of *Calliptamus italicus* took place in the Province. Three years' experiments with poisoned baits against this locust have given negative results [*cf. R. A. E.*, A, xii, 20].

[Brzhezitzki (P.).] **Бржезицкий (П.). К статье "Саранчевая опасность"** [An Addition to the Article "The Locust Danger."]—**Хлопковое Дело** [*Cotton Indust.*], ii, no. 1–2, pp. 94–95. Moscow, January–February 1923. [Received 2nd May 1924.]

Referring to the article by Nikolski [see above], the author expresses the opinion that all anti-locust measures were inadequate, and that this may lead to a complete breakdown of the cotton industry in Turkestan. It is advised that *Coccobacillus acridiorum* should be introduced with the assistance of foreign entomologists.

[Plotnikov (V.).] **Плотников (В.). Саранчевые перспективы на 1923 год в Туркестане.** [The Locust Prospects of 1923 in Turkestan.]—**Хлопковое Дело** [*Cotton Indust.*], ii, no. 3–4, pp. 34–36. Moscow, March–April 1923. [Received 2nd May 1924.]

The anti-locust campaign of 1922 in Turkestan was not successful owing to inadequate financial resources and the indifference of the population and of the local authorities. The position with regard to *Calliptamus italicus* in Samarkand, Ferghana and Transcaspia in 1923 was very serious indeed.

[Nikolski (V.).] **Никольский (В.). О гробовой доске хлопководства от саранчи, саранчевой бацилле и заграничных энтомологах.** [On the Gravestone of the Cotton Industry as a Result of Locust Danger, on the Locust Bacillus and Foreign Entomologists.]—**Хлопковое Дело** [*Cotton Indust.*], ii, no. 3–4, pp. 37–41. Moscow, March-April 1923. [Received 2nd May 1924.]

The author states that all attempts to utilise *Coccobacillus acridiorum* against locusts in Russia and elsewhere have failed, and that the attention of entomologists throughout the world is being directed towards improving the use of poisoned baits. The failure of the anti-locust campaigns of several preceding years is attributed entirely to inadequate organisation, and the danger can only be averted by establishing local entomological bureaux in every Province.

[Aigin (I.).] **Аигин (И.). Мексиканский хлопковой коробочный долгоносик.** [Mexican Cotton Boll Weevil.]—**Хлопковое Дело** [*Cotton Indust.*], ii, no. 5–6, pp. 54–58. Moscow, 1923. [Received 2nd May 1924.]

A general account is given of the injury caused by *Anthonomus grandis*, Boh., to cotton in North America and the remedial measures employed against it are reviewed. Though this weevil has not yet

occurred in Turkestan and climatic conditions would appear to be unfavourable to its establishment, the possibility of its introduction must not be lost sight of, especially in connection with the importation of American cotton seed.

[Sevastyanov (I.).] **Севастьянов (И.). Ворьба с саранчей в Туркестане в 1923 году и ближайшие перспективы.** [The Anti-locust Campaign of 1923 and immediate Prospects.] —**Хлопковое Дело** [*Cotton Indust.*], ii, no. 9–10, pp. 126–145. Moscow, September–October 1923. [Received 12th April 1924.]

The registration of places where locusts deposited their eggs in the autumn of 1922 was done very badly, and locusts appeared in 1923 over an area 3–6 times as large as was expected. Control measures consisted in spraying, poisoned baits, burning, and driving the insects into ditches. The campaign was very much hampered by inadequate funds and by their being issued too late. The organisation was headed by two entomologists and the technical staff numbered 247, the population providing labourers and transport animals under compulsion, which aroused serious discontent.

The Moroccan locust [*Dociostaurus maroccanus*, Thunbg.] is stated to have been much less harmful in Turkestan since 1917. In that year there was a large outbreak, but all the enormous swarms of larvae perished from starvation, as the spring was abnormally dry and there was no grass in the places where they hatched. The Italian locust [*Calliptamus italicus*, L.]is, on the contrary, becoming a very serious pest, and a marked increase in its numbers is due to a regression in the methods of cultivation and to large areas, formerly under cultivation, being abandoned and covered with weeds, such lands being the favourite breeding-grounds for this locust. An intensification of agriculture would naturally lead to narrowing down these breeding-grounds, but in the meantime the Italian locust will continue to be a dangerous pest, especially of cotton. Knowledge of the biology of the Asiatic locust [*Locusta migratoria*, L.] is still very inadequate, and extensive researches are absolutely necessary ; spraying is considered by the author to be the best and cheapest method of combating this species. The results of the 1923 campaign are stated to be satisfactory, since only a little damage has been done by locusts to crops. A lack of funds prevented the carrying out of the usual autumn registration of places where locusts laid their eggs, and this makes the prospects of the campaign of 1924 very uncertain.

[Printz (Ya.).] **Принц (Я.). Хлопковые вредители в Закавказье.** [Cotton Pests in Transcaucasia.]—**Хлопковое Дело** [*Cotton Indust.*], iii, no. 1–2, pp. 71–73. Moscow, January–February 1924.

The existing scanty records of cotton pests in Russia are briefly reviewed. *Tetranychus telarius*, one of the chief pests of this crop in Armenia, and *Heliothis obsoleta* (*armigera*) have been studied by the author, and a brief account is given of the bionomics of the latter. It has two generations a year in Transcaucasia, hibernation occurring in the pupal stage in the ground. It attacks maize with equal avidity, and it is therefore suggested that this should be used as

a trap crop. For this purpose the maize should be sown in small square patches between the cotton. Spraying is not recommended owing to the scarcity of water, but good results should be obtained with dusts. In this connection the work of American authors is described.

The need for further work in connection with cotton pests in Russia is pointed out.

[Arkhangelskaya (A. D.).] **Архангельская (А. Д.) К фауне червецов или щитовок (Coccidae) Туркестана.** [The Coccid Fauna of Turkestan.]—**Труд. Туркестанск. Научн. О-ва.** [*Trans. Turkestan Sci. Soc.*], i, pp. 259–266. [Tashkent] 1923. [Received 22nd April 1924.]

Very little work appears to have been done in connection with the study of the Coccids of European Russia, the systematic side having been completely neglected. The scanty references to the records of Coccids are reviewed.

The species listed were collected in Turkestan; they comprise *Asterolecanium variolosum*, Ratz., on oak; *Eriococcus aceris*, Sign., on willow, infesting the bark; *Phenacoccus* sp. on *Zygophyllum* sp. and another species on *Phlomis*; *Aspidiotus britannicus*, Newst., on *Eleagnus hortensis*; *A. ephedrarum*, Léon., on stems of *Ephedra*; *A. ostreaeformis*, Curt., a very serious pest of many fruit and ornamental trees; *A. transcaspiensis*, Marlatt, on poplar and willow; *Diaspis* (*Aulacaspis*) *rosae*, Bch., on cultivated roses and on the stems and leaves of raspberry and blackberry; *Chionaspis salicis*, L., on wild and cultivated willow; *C. etrusca*, Léon., on branches of *Tamarix*; *C. striata*, Newst., on *Thuja* and *Juniperus*; *Lepidosaphes ulmi*, L., on apple, plum and willow; *L. juniperi*, Ldgr., on *Juniperus* and *Thuja*; *L. pinnaeformis*, Bch. (?) on the bark of *Eleagnus hortensis*, particularly on old trees; *Lepidosaphes* (*Leucaspis*) *riccae*, Targ., on stalks of *Ephedra*; *Leucaspis* sp. in large numbers on willow; *Eulecanium* (*Lecanium*) *bituberculatum*, Targ., on apple, pear and *Crataegus*; *E.* (*L.*) *ciliatum*, Dougl., on pears, wild apples and occasionally on willow; *E.* (*L.*) *corni*, Bch., abundant on *Robinia pseudacacia*, also occurring on almost every possible fruit and ornamental tree and shrub and even on many garden and vegetable plants, though of no serious importance as a pest; *Saissetia* (*L.*) *hemisphaerica*, Targ., on bark of elm and stalks of vine; *Coccus* (*L.*) *hesperidum*, L., on *Citrus* under glass; the same or a related species on palms; *Eulecanium* (*L.*) *persicae*, F., on *Morus*, *Mahonia aquifolium*, plums and *Robinia pseudacacia*; *E.* (*Physokermes*) *coryli*, L., on many indigenous fruits, also on plum, peaches, almond and black currant, and at a height of 4,000 ft. on *Spiraea crenifolia*; *Physokermes unifasciatus*, sp. n., apparently essentially a pest of peaches, causing serious injury to this crop in the vicinity of Samarkand; *Pulvinaria artemisiae*, Sign., on stems of *Artemisia* sp.; *P. betulae*, L., on poplar, and occasionally on pears, willows, *Crataegus* and *Rhamnus cathartica*; *Pulvinaria* sp. on woody stems of some kind of Labiatae; *Guerinia* (*Gueriniella*) *serratulae*, F., on willow, poplar, *Platanus orientalis*, *Robinia pseudacacia*, apple, *Morus*, *Aesculus hippocastanum*, *Mahonia*, *Tamarix*, etc.; and *Orthezia urticae*, L., on *Artemisia*, *Perowskia*, *Lonicera*, *Rosa* and *Crataegus*, occurring in large numbers on the trunk, branches and leaves.

Jack (R. W.). **On the African Species of the Dynastid Genus** *Heteronychus*.—*Trans. Ent. Soc. Lond.*, 1923, pt. 3–4, pp. 367–438, 6 pls. London, 15th April 1924.

The systematic position of the genus *Heteronychus*, Burm., is reviewed. A key and descriptions are given of the African species, including nine new ones.

In Africa several species are of economic importance, two well-known pests being *H. arator*, F., which attacks maize in Cape Colony, and *H. licas*, Klug, a pest of sugar-cane in the coastal districts of the tropics and Natal. The latter is also very destructive to maize in Rhodesia, where it has been recorded by the author under its synonym *mashunus*, Pér. [*R. A. E.*, A, vi, 239]. *H. inops*, Pér., and *H. dissidens*, Pér., have proved capable of severe damage to maize crops at high elevations in Southern Rhodesia. Isolated individuals of *H. punctipollis*, sp. n., and *H. foveolatus*, sp. n., have also been taken associated with this crop.

These beetles apparently do not occur north of the latitude of Senegal in the west or of southern Nubia (Blue Nile) in the east, nor in the arid regions of south and south-east Africa, but it is probable that the genus is represented throughout the whole of the intermediate area.

Wilkinson (H.). *Antestia* **in Uganda.**—Typescript, 8 pp. [Entebbe] Uganda, 28th February 1924. [Received from the Colonial Office, 14th April 1924.]

A summary of the life-history of *Antestia* [*lineaticollis*, Stål] in Uganda is given and compared with that in Kenya Colony [*R. A. E.*, A, vii, 405]. In Uganda the life-history is practically twice as rapid as in Kenya, and yet the average female lays 78 per cent. of the number of eggs laid by the average female in Kenya. There are about 3 generations a year, but as they overlap, it is possible to find all stages of the insect at the same time, and therefore any remedy, to be effective, must deal with all stages simultaneously. Spray fluids have been found useless. There are indications that growing the plants in a solution containing potash and phosphorus in the proportion of 4 : 1 renders the sap distasteful to *Antestia*, and investigations on this are being continued. It is believed that the indirect effect of climate acting on the soil is of greater importance than any direct effect it may have on the insects themselves. This is borne out by the fact that the bug can be found on many estates and in districts where it does little damage and yet is always present. There also seems to be a distinct connection between the amount of damage done by the bug and the degree of dryness of a district. The author is of opinion that some of the causes of loss of crop attributed to *Antestia* may be merely physiological, and is continuing experiments in pursuance of this investigation. Pending further discoveries, the treatment suggested is cultivation of the soil, especially in dry weather, in order to conserve as much moisture as possible during that period. Coffee should be grown under light shade, as little damage seems to be caused by *Antestia* under these conditions. Eggs and adults should be collected and kept until all parasites have emerged. Smoking the bushes is a good preliminary to collection, a piece of old bark cloth tied to the end of a stick answering the purpose very well, as it burns slowly and produces a dense smoke ; this should be done at least once every 14 days.

DELASSUS (—). **Le Pou rouge** (*Chrysomphalus dictyospermi, Chrysomphalus minor*) **en Algérie.**—*Rev. agric. Afr. Nord,* xxii, nos. 244 & 245, pp. 216–219 & 232–236, 8 figs. Algiers, 4th & 11th April 1924.

The scales, *Chrysomphalus dictyospermi* and *C. pinnulifera* (*minor*), became so abundant in Algeria in 1923 as to constitute a serious menace. Owing to the local nature of the infestations, it is thought that some parasite must be keeping the pest in check in many places, and attempts are being made to find it. Its abundance seems to be largely related to altitude, a difference of 30 to 45 ft. in altitude being sufficient to mark the presence or disappearance of its action. The food-plants of the scales are many and varied, including palms, fig, ivy, etc., the Aurantiaceae always being preferred. Lime-sulphur solutions such as are used in California are recommended. Their use is not sufficiently general in Algeria, but where they have been used at the right time very successful results have been obtained, and when their value becomes better known they will doubtless be more widely applied. The mixture recommended is 4 lb. lime and 8 lb. sulphur, with sufficient water to make 5 gals., and its preparation is described. Experiments indicate that it should be used during the growing period of the plant, at a strength of 8 per cent., increased to 10 per cent. in winter. Although winter sprays are valuable, it is in the spring that the insect is most vulnerable, particularly from April to June, while the young larvae are hatching. A month or two after the applications have been made the trees begin to recover and the most severely infested leaves drop off. The apparatus suitable for spraying is described. It is hoped that some natural enemy may be found that will eventually control the scale by biological methods; in Madeira a Chalcid, *Aspidiotiphagus lounsburyi,* is found to reduce it to negligible proportions, and it has been introduced into Italy, where it promises very well. It is now on its way to Algeria, where it is hoped that it may become established.

Plant Protection Ordinance, 1924—Order.—*Official Gaz. Govt. Palestine,* no. 112, p. 588. Jerusalem, 1st April 1924.

The following are declared to be pests:—the beetle borer of almond trees, *Capnodis carbonaria,* Klug; the black scale, *Chrysomphalus aonidum,* L. (*Aspidiotus ficus*); the red scale, *Chrysomphalus aurantii,* Mask.; the fig scale, *Ceroplastes rusci,* L.; the migratory locust, *Locusta* (*Acridium*) *migratoria,* L.; the Mediterranean fruit-fly, *Ceratitis capitata,* Wied.; and *Phylloxera vastatrix,* Planch.

Plant Protection Ordinance, 1924—Order.—*Official Gaz. Govt. Palestine,* no. 112, pp. 589–590. Jerusalem, 1st April 1924.

The introduction into Palestine of a number of plants, or parts of them, from Egypt is prohibited. Others may only be imported if accompanied by a certificate that they are free from disease or have been fumigated with hydrocyanic acid gas. Nursery stock from countries other than Egypt may only be imported if accompanied by a certificate of freedom from pests and disease, and any found infested may be destroyed. Fruits, roots, tubers, seeds and parts of living plants, other than nursery stock, may be introduced only if found free from pests or infested only with pests of common local occurrence.

Plant Protection Ordinance, 1924—Regulations.—*Official Gaz. Govt. Palestine*, no. 112, pp. 590–591. Jerusalem, 1st April 1924.

Citrus plants or any parts or fruits of them may not be moved from any part of Palestine into the sub-district of Jaffa.

All trees badly infested by the beetle borer of almond trees (*Capnodis carbonaria*, Klug) must be cut down, the roots dug up and all parts of the tree burned. To control the black scale, *Chrysomphalus aonidum*, L. (*Aspidiotus ficus*), and the red scale, *C. aurantii*, Mask., fumigation with hydrocyanic acid gas must be carried out. The appearance of locusts must be at once notified, egg-masses collected and steps taken by means of trenches and poison to destroy the insects.

Patel (M. L.). **Notes on Cotton Bollworm Attack at Surat.**—*Agric. Jl. India*, xix, pt. 2, pp. 130–140. Calcutta, March 1924.

Two noticeable features of the cotton crop in South Gujarat, considered over a series of years, are the extraordinary variability of the yield and a certain check to early flowering. The loss of early flower-buds has been found to be due, to a great extent, to *Earias* sp. (spotted bollworm), which also affects the later flowers to some degree. The major portion of the ultimate crop is produced from flowers opening in two weeks only. A series of curves and a table of figures show the effect of the bollworm; the pink bollworm [*Platyedra gossypiella*, Saund.] appears later, but is not a serious danger at the time under consideration. Various efforts have been made to check the depredations of the spotted bollworm. Trap-crops (generally *Hibiscus esculentus*) have been grown with cotton and then removed and destroyed; it was found, however, that the trap-crop was not so attractive as to prevent infestation of cotton, though it lessened it somewhat while it was there. The moths, however, were not at their maximum numbers until after the trap-crop had been removed. The numbers can be reduced considerably by killing the paired moths while they are dormant, in the early morning and the evening. An attempt was made to destroy the early generations by removing the top shoots of the cotton plants, but as it is impossible to remove all or even a large proportion of the growing shoots at the end of September or early in October, when the cotton is making its growth, the plan has not been a success. With a combination of the above methods there is a distinct improvement, but the remaining attack is so great that they do not warrant the cost and trouble involved, for full infestation of the crop occurs in the later stages. It was noticed that between the third week in November and the second in December there was a sudden and very large reduction in the proportion of infested flowers, which is apparently due to heavy parasitism of the bollworm by *Microbracon lefroyi*. If this should prove to be the cause, the cultivation of this parasite would seem to be the most promising method of dealing with the pest in Gujarat.

Husain (M. A.) **Annual Report of the Entomologist.**—*Rept. Dept. Agric. Punjab 1922–23*, pt. i, pp. xxv–xxxi. Lahore, 1924.

The cotton bollworms, *Earias insulana*, Boisd., and *E. fabia*, Stoll, were kept in check without special remedial measures in the Punjab in 1922–23. Parasites of 13 different species were recorded, but their efficacy is doubtful. Rope-dragging and flooding would seem to be an

effective method and was tried on a small scale with promising results. *Platyedra gossypiella*, Saund. (pink bollworm) was present in alarming numbers in some localities. The indications are that infestation most probably is not carried to the fields with the seed but that the moths fly to the growing crops from cotton store-houses. *Sphenoptera gossypii*, Kerr. (cotton stem borer) was reported from two localities ; the details of its life-history are not known. The systematic removal and burning of attacked plants is effective. Legislation is badly needed to enforce the destruction of all cotton sticks and stubble before the new crop is sown. *Myllocerus blandus*, Fst. (cotton weevil), which has been troublesome in the past [*R. A. E.*, A, xii, 91], has fortunately ceased to do any material harm. A study of the moth-borers has shown that while *Chilo simplex*, Butl., is the main pest of maize and juar [*Sorghum*], the borers attacking sugar-cane are *Diatraea auricilia*, Ddgn., *Emmalocera* sp. and *Scirpophaga* sp. Maize is, therefore, useless as a trap-crop for sugar-cane, and it is considered that the best remedy is the collection and burning of stubble before the end of March. Citrus growing is very popular in the canal colonies, but Psyllids and Aleurodids are rapidly spreading. The former can be easily checked by spraying, but the latter are very difficult to kill. One application kills about 60 per cent., and therefore 3 or 4 must be given.

Superheating has proved a very effective and economical way of dealing with infested warehouses. Air-tight storage has not as yet given results of practical utility. It is unfortunate that no restriction is placed on the storage of weevil-infested wheat, and heating machines have not been installed. Parasitic work included the breeding of many generations of the egg parasites of *Euproctis fraterna*, Mo., but these unfortunately died in the heat. The parasites of Psyllids on *Citrus* were studied in detail and a number of new species recorded. *Tetrastichus radiatus*, Wtrstn., which is a very effective check in certain localities of the Punjab, is itself attacked by a parasite. Larvae and pupae of *Coccinella punctata*, L., and of *Adonia doubledayi*, Muls., were heavily parasitised by a small Chalcid.

An account is given of the sericultural work of the year.

South (F. W.) & Birkinshaw (F.). **Summary of the Work of the Inspection Division for the first three Quarters of 1923.**—*Malayan Agric. Jl.*, xii, no. 2, pp. 32–50. Kuala Lumpur, February 1924.

Every effort is being made to reduce the numbers of the coconut beetles, *Oryctes rhinoceros* and *Rhynchophorus schach*. Many dead coconut trees that formed breeding places for *O. rhinoceros* have been removed, but the chief difficulty is to persuade plantation owners to remove the cattle manure in which the beetles breed. As the manure is used as a top dressing in some plantations, the problem of enforcing this measure is difficult. *R. schach* is particularly troublesome in districts where sago palms are grown over large areas, the beetle breeding in the refuse left after removal of the crop. The inaccessibilty of these districts also makes control of the pest a difficult matter. Attacks of *Brachartona catoxantha* have occurred locally, but generally die out as a result of parasitism and infection with the fungus, *Botrytis*. In one district a certain area of tall trees was sprayed with water from a fire engine ; large numbers of caterpillars were dislodged from the trees and destroyed. This area was noticeably freer from the pest in

the next generation of caterpillars. Rice stem borers were more numerous in some localities than in the previous season, but unfortunately it was not ascertained which species caused the damage that was observed. *Leptocorisa* sp. and *Nymphula depunctalis* in nurseries were also injurious to rice. Mango trees were damaged by *Rhytidodera simulans* (mango branch borer); attempts are being made to find a remedy. Borers in nutmeg and clove plantations are doing considerable damage and are being investigated.

CORBETT (G. H.). **The Two-coloured Coconut Leaf Beetle** (*Plesispa reichei*, **Chap.**).—*S.S. & F.M.S. Dept. Agric.*, Bull. 34, 20 pp., 3 pls. Kuala Lumpur, 1923. [Received 14th April 1924.]

The Hispid, *Plesispa reichei*, Chap., is an important pest of the coconut palm in Malaya, particularly attacking seedlings in the nursery and young coconut palms in the field up to 2 or 3 years of age. The stages of the insect are described. The eggs are laid on the leaves, the largest number deposited by one female being 112 in 249 days. The eggs hatch after 7–10 days, and the larvae feed, as do the adults, on the surface of the partly folded leaves. The larval stage lasts from 30 to 38 days (usually about 33); pupation occurs on the leaves and occupies from 6 to 11 days. The maximum length of life for the adult male was 9 months and for the female about 9½ months. Hand collection can be practised with much success; 28 days appears to be the minimum age of the female at first oviposition, so that if all the beetles were hand-collected about every 22 days for 4 times, and there was no further infestation from outside, the palms should be freed from all stages in about 3 months. If hand collection is not possible, the central part of the plant should be well sprayed with 4 lb. lead arsenate to 100 gals. of water. Nurseries should not be made under coconut trees, but should be prepared under other trees or in a shady place. Previous to planting, young seedlings should be immersed in a solution of lead arsenate as above, and if subjected to heavy rains before planting out they should be immersed again, or if planted out should be sprayed so as to kill the larvae that have in the meantime hatched from the eggs. A Chalcidoid egg parasite has been found but has not yet been studied.

JEPSON (F. P.). **The Control of Tea Termites.**—*Yearbk. Dept. Agric. Ceylon, 1924*, pp. 7–10, 2 pls. Peradeniya, January 1924.

Much of the information in this paper has been previously noticed [*R. A.E.*, A, xi, 315]; further experiments with certain proprietary substances are described.

JARDINE (N. K.). **Plantain Root Beetle Borer** (*Cosmopolites sordidus*, **Germar**).—*Yearbk. Dept. Agric. Ceylon, 1924*, pp. 55–58, 1 pl. Peradeniya, January 1924.

A short account is given of *Cosmopolites sordidus*, Germ., which is becoming a menace to the banana industry of Ceylon, and the usual remedial measures are suggested. No natural enemies of this weevil are known to be present in Ceylon. The predacious Histerid, *Plaesius*

javanus, from Java, which was successfully introduced into Fiji in 1923, might be established in Ceylon with equally good results.

JEPSON (F. P.). **An Emergency Method of applying Spray-fluids.**—*Yearbk. Dept. Agric. Ceylon, 1924*, p. 59. Peradeniya, January 1924.

In cases of sudden outbreaks of insect pests, especially leaf-eating caterpillars, on areas where no spraying machinery is available, it has been found possible to spray successfully by means of bunches of leafy twigs dipped in a solution of 1 oz. lead chromate to 3 gals. of water or of ½ oz. Paris green and a little lime to 4 gals. of water.

AUSTIN (G. D.). **The Indian Glow-worm** (*Lamprophorus tenebrosus*, **Wlk.**).—*Yearbk. Dept. Agric. Ceylon, 1924*, pp. 68–69, 1 pl. Peradeniya, January 1924.

The Malacoderm, *Lamprophorus tenebrosus*, Wlk., is predacious on the African snail (*Achatina fulica*), which is a serious pest of vegetables and flowering plants. Females have been observed in numbers from October to January. Oviposition lasts from 1 to 3 weeks, and the female broods over the eggs (of which from 30 to 100 may be laid in a burrow) for about 4 to 13 weeks. After hatching, the larvae crawl about actively in search of their prey. Only the larvae were observed by the author to attack snails, this stage lasting from 8 to 9 months. Under insectary conditions 20 to 40 snails were devoured by the male during the larval period and 40 to 60 by the female. The larvae feed chiefly by night, and shelter under stones or leaves by day. Pupation occurs in a burrow or cell made by the larva and lasts about 1 week in the case of females and 3 weeks in the case of males. All stages of the insect are luminous.

KARNY (H. H.). **Uit het leven der vijgeninsekten.** [From the Life of Fig Insects.]—*Tropische Natuur*, 1923, no. 9, pp. 129–136, 12 figs. [*sine loco.*] [Received 15th April 1924.]

If fig cultivation is to be attempted in the Dutch East Indies, attention must be paid to the insects connected with these trees. A brief account is given of the rôle played by Chalcids of the subfamilies AGAONINAE and IDARNINAE, the latter being parasites of the former, which effect caprification.

FEUILLETAU DE BRUYN (W.). *Helopeltis*-**bestrijding.** [*Helopeltis* Control.]—*Meded. Proefst. Thee*, no. 86, 14 pp. Buitenzorg, 1924.

The " pegat " system is advised as a means for combating *Helopeltis*. This consists in planting hedges of green-manure plants between the rows of tea, and the author suggests that the enclosure of *Helopeltis* in the areas limited in this way leads to degeneration consequent on inbreeding, with the result that the pest decreases. According to him this would explain the effect of pruning alternate rows of tea and of planting green-manure hedges in tea plantations [*R. A. E.*, A, xi, 215, 542].

FULMEK (L.). **Over bladbeschadigingen bij Deli-tabak na behandeling met arseenpreparaten tegen rupsenvraat.** [Leaf-injury in Deli Tobacco after Treatment with Arsenicals used against Caterpillars.] —*Meded. Deli Proefst.*, 2nd Ser. xxxvii, 13 pp. Medan, 1924.

Arsenicals are now in general use against caterpillar pests of tobacco in Sumatra, and this paper deals with the various causes of scorching that occur with these insecticides applied as sprays to seedlings and as dusts to tobacco in the field. As a rule, lead arsenate as a 1–2 per cent. solution and 5–10 per cent. dust, and Paris green as a 0·75 per cent. dust are the strengths employed. The different forms of scorching are described. Lead arsenate contains water-soluble arsenic acid (As_2O_5) and arsenious acid (As_2O_3). These soluble compounds cause scorching, and not more than 0·5 per cent. of the former and 0·1 per cent. of the latter should be present. A basic or triplumbic lead arsenate ($Pb_3(AsO_4)_2$) is specially valuable in a warm and humid climate. The Paris green should contain about 55–58 per cent. of arsenious acid (As_2O_3), of which not more than 0·4 per cent. should be water-soluble and there should be no water-soluble copper. It is found that a spray of 1 per cent. lead arsenate with 0·3 per cent. soap is quite satisfactory for seedlings. The quality of the water is important, because chlorine, magnesium or lime readily cause scorching, especially if an acid lead arsenate ($PbHAsO_4)_2$ be used. The other substances contained in an insecticide, *i.e.*, soap, Bordeaux mixture, lime and flour, also are of importance. A soft, yellow palm-oil soap is preferable to green soap, and the latter again to hard bar soap. Lime (whether in a dust or in a spray) diminishes scorching but also the killing value of the arsenical. Flour is not good for a dust to be used in wet weather because it encourages fungus growths. Bordeaux mixture of 1 per cent. strength yields an excellent combination with lead arsenate. The sprayer should deliver a fine jet and should permit of its contents being well stirred. Dusts should be applied with a dust-gun, and not with a sprinkling tin.

MAÑALAC SAN JUAN (J.). *Prays citri* **Millière, a Rind Insect Pest of Philippine Oranges.**—*Philipp. Agriculturist*, xii, no. 8, pp. 339–348, 2 pls. Los Baños, January 1924.

Prays citri, Millière, causes considerable injury to *Citrus*, particularly pomelos (*C. decumana*) and oranges in the Philippines. A detailed account is given of the various stages, life-history and habits, as well as the general distribution of this moth.

The eggs are most frequently laid on the newly formed fruits and rarely on the flowers. Incubation lasts from 6 to 12 days, with an average of a little over 8 days. The young larvae bore into the rind of the fruit and eat the underlying tissue. The entire feeding period is spent in the cortex, resulting in the appearance of a tumour-like swelling on the outside of the fruit. From 20 to 30 galls, or even more, may be found on one fruit, the surface of which may be entirely covered. The exit holes made by the larvae encourage the growth of fungi and form a suitable shelter for mealybugs. The total length of the larval stage varies from 49 to 58 days. Pupae were found in cocoons on the surface of the fruit, usually in crevices in the skin, in sheltered portions of the leaves, and at the junctions of the twigs and branches. This stage lasts from 4 to 6 days.

Very little work has so far been done with regard to control experiments, but promising results were obtained with oil emulsion sprays, the insects being most susceptible to treatment during the pupal stage.

Uichanco (L. B.). **Studies on the Embryogeny and Postnatal Development of the Aphididae with special Reference to the History of the Symbiotic Organ or Mycetom.**—*Philipp. Jl. Sci.*, xxiv, no. 2, pp. 143–247, 13 pls. Manila, February 1924.

The contents of this paper are indicated by the title. The material used was drawn mainly from *Macrosiphum tanaceti*, L.

Rowan (A. A.). **The Rice Borer** (*Schoenobius incertellus* **Walker**).—*Philippine Agriculturist*, xii, no. 6, pp. 225–236, 1 pl. Los Baños, November 1923. [Received 5th May 1924.]

The Pyralid, *Schoenobius incertellus*, Wlk., is one of the most serious rice pests in the Philippines, though much of the injury due to it is frequently attributed to other causes. A detailed account is given of its life-history and habits [*cf. R. A. E.*, A., ix, 411] as well as of its seasonal occurrence in the Philippines. It is attacked by various parasites in its different stages, but these have not yet been closely studied.

The relative susceptibility of the different varieties of rice is shown in a table. Hand collection and clean cultivation should be practised, and it is possible that the submergence of the stalks in irrigated fields might kill the enclosed larvae.

Fulmek (L.). **Loodarsenaat-mengsels voor zaadbedden-bespuiting.** [Lead-arsenate Mixtures for Spraying Seed-beds.]—*Deli Proefst.*, Vlugschr. 25, 3 pp. Medan, March 1924.

The information given in this circular is included in a previous publication on arsenicals for caterpillar pests of tobacco [*R. A. E.*, A, xii, 270].

Fulmek (L.). **De delische tabaksluis op krokot** (*Portulaca oleracea*) **gevonden.** [The Deli Tobacco Aphid found on *P. oleracea*.]—*Deli Proefst.*, Vlugschr. 26, 4 pp., 1 fig. Medan, April 1924.

Myzus (*Aphis*) *persicae*, Sulz., is a serious pest of tobacco in Deli, Sumatra. Of the 80 odd other food-plants recorded for this cosmopolitan species, a number occur in the island, but while they are infested by other Aphids this one has not been noticed on them. It is therefore worthy of note that *M. persicae* has been found on *Portulaca oleracea*, which is common in tobacco districts.

Petch (T.). **Parasites of Scale-insect Fungi.**—*Trans. Brit. Mycol. Soc.*, viii, pt. 4, pp. 206–212, 3 figs. 1923. (Abstract in *Rev. App. Mycol.*, iii, pt. 4, p. 212. Kew, April 1924.)

Numerous fungi are discussed that are parasitic on several other fungi attacking Coccids in Ceylon and New Guinea.

SWEZEY (O. H.). **Notes on Insect Pests in Samoa.**—*Hawaiian Planters' Record*, xxviii, no. 2, pp. 214–219. Honolulu, April 1924.

This annotated list of insect pests studied in Samoa during September 1923 is arranged under the crops attacked.

Those attacking sugar-cane are: *Perkinsiella vitiensis*, Kirk., parasitised by a species of *Ootetrastichus*, probably *O. beatus*, Perkins; *Rhabdocnemis obscura*, Boisd.; *Elytroteinus subtruncatus*, Fairm.; *Melanitis leda*, L., found feeding on the leaves upon two occasions and widely distributed in the South Pacific and also occurring in Fiji; *Cosmopteryx dulcivora*, Meyr., fairly common though not very injurious, the larvae boring into the midribs of the cane leaves; the mealybugs, *Pseudococcus sacchari* and *P. calceolariae*; and *Neomaskellia* (*Aleurodes*) *bergi*, Sign.

The coconut pests are: *Oryctes rhinoceros*, L., *Rhabdocnemis obscura*, Boisd., and *Diocalandra taitensis*, Guér., all causing considerable injury; *Promecotheca reichei*, Baly, the larva of which bores into the leaf and feeds on the inner green part, transformation to adult taking place within the leaf, but which does not appear to be particularly injurious; the stick insects, *Graeffea minor*, Br., and *G. cocophaga*, Newp.; *Chrysomphalus rossi*, Mask.; *Scholastes bimaculatus*, Hendel, probably not a pest, as it apparently only breeds in decaying coconuts; and termites.

Bananas are attacked by *Cosmopolites sordidus*, Germ., probably only recently established, and *Nacoleia octasema*, Meyr. *Dacus* (*Chaetodacus*) *xanthodes*, Broun (papaya fruit-fly) occurs in the fruits of papaya, guava, granadilla, and avocado, and in several kinds of native fruits.

The leafhopper, *Megamelus proserpina*, Kirk., and the larvae of the Sphingid, *Hippotion* (*Chaerocampa*) *celerio*, L., were found feeding on the leaves of taro [*Colocasia antiquorum*]. The larvae of *Glyphodes indica*, Saund., occasionally attack cucumber vines, and a leaf-beetle, probably *Aulacophora fabricii*, is fairly abundant on squash and pumpkin vines.

As only a very few of these insects are at present known in Hawaii, every effort should be made to prevent their introduction, particularly as under Hawaiian conditions they are likely to become much more serious pests than they appear to be in Samoa.

MILLER (D.). **The Mealy-bug Pest in Orchards. Control by** *Cryptolaemus* **Ladybird.**—*N. Z. Jl. Agric.*, xxviii, no. 3, pp. 163–165, 2 figs. Wellington, 20th March 1924.

The Coccinellid, *Cryptolaemus montrouzieri*, Muls., was introduced into New Zealand as early as 1897, in an attempt to control mealybugs, of which the chief are *Pseudococcus maritimus*, Erh., and *P. comstocki*, Kuw. Of recent years, however, it has become very uncommon, and fresh consignments are now being sent from New South Wales and from California, the last also including another Coccinellid, *Scymnus binaevatus*, Muls., and an Encyrtid parasite *Tanaomastix* (*Leptomastix*) *abnormis*, Gir. The method of rearing these beetles is that adopted in California [*cf. R. A. E.*, A, viii, 318, etc.].

Myers (J. G.) & Atkinson (E.). **The Relation of Birds to Agriculture in New Zealand. viii. The Pigeon, Kiwis, Rails and Shore-birds.**—*N. Z. Jl. Agric.*, xxviii, no. 3, pp. 166–175, 2 figs. Wellington, 20th March 1924.

Among the birds that should receive every protection in New Zealand on account of their insectivorous habits are the kiwis (*Apteryx* spp.), which subsist chiefly on grubs of borer beetles and other injurious insects; the Ralliformes, such as *Porphyris melanotus*, which searches for grasshoppers among the sand-dunes, the smaller landrails, *Hypotaenidia philippensis*, and others, which are almost entirely insectivorous, keeping in check such pests as the larvae of *Xanthorhoë praefectata*, Wlk., and *Melanchra steropastis*, Meyr., infesting *Phormium tenax*, as well as grasshoppers and cutworms, and the wekas (*Gallirallus* spp.), which eat large numbers of grass-grubs (*Odontria*), which are one of the worst enemies of pastures in New Zealand, as well as other insects; and shore-birds, such as plovers, which are practically all insectivorous to a certain extent.

Simmonds (J. H.). **A New Cotton Pest.**—*Queensland Agric. Jl.*, xxi, pt. 3, pp. 187–191, 4 pls. Brisbane, March 1924.

The cause of considerable injury to cotton in the Wooloogа district has now been found to be the Chrysomelid, *Rhyparida australis*, Boh., which is a fairly common insect in Queensland. The beetles eat round the soft outer tissue of stems on leafstalks, sufficient to ringbark the lateral shoot or leaf and cause it to wilt. They feed at night. In bad cases the plant may be entirely defoliated. The beetles may be destroyed by carrying large kerosene flares between the rows and beating the bushes so as to dislodge the beetles, which will fly to the flame.

A few individuals of another Chrysomelid, *Geloptera scitula*, Lea, were also found on the cotton, but were not probably responsible for much of the injury.

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxi, pt. 3, p. 199. Brisbane, March 1924.

Tachinid parasites have been liberated in various districts, and the recovery of empty puparia of *Ceromasia sphenophori* in standing cane shows that this Tachinid has begun breeding under natural conditions in at least one locality.

Experiments with lead and copper arsenate dusts for the destruction of [*Lepidoderma*] *albohirtum* show that dry arsenicals, dusted thinly on the leaves of the favourite food-plants, will kill the beetles in less than two and a half days after feeding.

Lime-Sulphur and Iron-Sulphide Sprays.—*Dept. Agric. Tasmania*, Bull. 111, 2 pp. [Hobart,] 1923.

These tables are calculated in order that any strength of lime-sulphur solution may be used in making iron-sulphide sprays. The usual formula is 1 gal. lime sulphur, 33°Bé., 3 lb. iron-sulphate and 50 gals. water. The 3·225 lb. of sulphur contained in one gallon of lime-sulphur, 33°Bé., is necessary to combine with the 3 lb. of iron sulphate. If the lime-sulphur registers less, it means there is less sulphur and a

larger quantity of the solution must be used. Two tables are given for the preparation of 40 and 50 gallons of spray respectively, and they are so arranged that opposite every division of the hydrometer will be found the amount of lime-sulphur solution containing the required 3·225 lb. of sulphur.

TICE (C.). **The British Columbia Potato.**—*B.C. Dept. Agric.* (Soil and Crop Branch), Bull. 86 (Revised Edition), 84 pp., 78 figs., 1 map. Victoria, B.C., 1924.

In this revised edition [*R. A.E.*, A, ix, 244] additional notes are given on the control of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] [*R. A.E.*, A, xii, 205] as well as of leafhoppers and Aphids attacking potato.

CUTRIGHT (C. R.). **Predaceous Forms of Beneficial Insects.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, viii, no. 11–12, pp. 173–179, 8 figs. Wooster, Ohio, November-December 1923.

This is a general popular survey of various types of predacious insects that occur in the United States, and particularly in Ohio.

GOSSARD (H. A.). **Some Ohio Birds : Their Food Habits and Value.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, viii, no. 11–12, pp. 180–186, 3 figs. Wooster, Ohio, November-December 1923.

A brief and popular account is given of the food-habits of some of the commoner birds of Ohio from the point of view of insect destruction, and in some cases all the constituents of the food are indicated. Measures for the protection of the more valuable species are also considered.

The Insect Pest Survey Bulletin.—*U.S. Dept. Agric.*, iv, no. 1, 27 pp. multigraph. [Washington, D.C.,] 1st April 1924.

This review of the outstanding entomological features in the United States and Canada covers the period from November 1923 to April 1924. A discussion on methods of estimating insect abundance and damage held by the American Association of Economic Entomologists brought out many interesting features of survey work, and the appointing of a committee to standardise methods of estimating insect abundance will undoubtedly lead to the accumulation of many useful data on the subject. *Pyrausta nubilalis*, Hb. (European corn borer) only increased slightly in the infested territory in the western part of its distribution, but two new infestations made a material advance towards the south-eastern maize-growing area. *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly) appeared in abundance in the extreme west of Kansas, which has hitherto been beyond the limit of infestation. Severe weather in the southern States seems to have killed many hibernating boll weevils (*Anthonomus grandis*, Boh.) and also destroyed so many sweet potatoes that the numbers of sweet potato weevils [*Cylas formicarius*, F.,] were much reduced, as were those of the Australian tomato weevil [*Listroderes nociva*, Lea] in the laboratory and presumably also in the field. *Phthorimaea operculella*, Zell. (potato tuber moth) was recorded for the first time in the eastern

United States, the pepper weevil [*Anthonomus eugenii*, Cano] in California, and the oriental fruit moth [*Cydia molesta*, Busck] in Valdesta, Georgia (70 to 80 miles from the peach section).

In Canada, *P. nubilalis* caused much more widespread loss in the infested section of southern Ontario in 1923 than in previous years. The grasshopper, *Camnula pellucida*, Scudd., which has been troublesome in British Columbia for the past 2 years, is now on the decline, but *Melanoplus atlantis*, Riley, *M. packardi*, Scudd., and *M. bivittatus*, Say, are expected to appear in large numbers. *Pemphigus betae*, Doane (beet root aphis) was prevalent throughout the Lower Fraser Valley of British Columbia, and is being studied, *Cephus cinctus*, Nort. (wheat-stem sawfly) is the principal wheat pest of Manitoba, though its parasite, *Microbracon cephi*, Gahan, is steadily increasing. Owing to favourable winter conditions, many vineyards in Ontario will probably be infested with the grape leafhoppers, *Erythroneura comes*, Say, and *E. tricincta*, Fitch, during 1924. The cutworm, *Euxoa excellens*, Grt., was very numerous in Vancouver in 1923, but numbers were destroyed by wilt disease and by parasites in the autumn. A general increase in *Aspidiotus perniciosus*, Comst. (San José scale) in Ontario has been observed. The brown-tail moth, *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), has been remarkably scarce in some formerly important centres in Nova Scotia. The eggs of *Aphis pomi*, DeG. (green apple aphis) are abundant in the apple orchards of south-western Ontario. *Halisidota tesselaris*, S. & A. (tussock caterpillar) was abundant throughout eastern Canada in the summer and autumn of 1923, doing considerable injury to apple orchards and to various trees and shrubs.

A detailed report of the various pests occurring in the period under review is given.

Hetherington (D. C.). **Comparative Studies on certain Features of Nematodes and their Significance.**—*Illinois Biol. Monographs*, viii, no. 2, pp. 107–166, 4 pls., 6 figs. Urbana, Ill., April 1923. [Received 2nd May 1924.]

This paper on the structure of Nematodes contains a list of 40 free-living species and 35 parasitic species, with many synonyms.

Horne (W. T.), Essig (E. O.) & Herms (W. B.). **Plant Disease and Pest Control.**—*Univ. California Agric. Expt. Sta.*, Circ. 265, 104 pp. [Berkeley, Cal.,] June 1923. [Received 2nd May 1924.]

A short account is given of various diseases and insect pests, under the heading of the crops they attack, with notes on remedial measures for each. A section is also taken up with miscellaneous causes of poor condition in plants, another with household pests and animal parasites, and another with formulae and descriptions of insecticides, etc., and remedial practices. An index is appended.

Thatcher (R. W.) & Streeter (L. R.). **Combination Sprays.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 50–56. Rochester, N.Y., 1924.

Laboratory experiments show that there is an actual change in composition when acid lead arsenate and lime-sulphur solution are

combined for use against insects and fungus diseases. The change is greater with acid arsenates than with neutral or basic arsenates, and also greater with lead arsenates than when calcium arsenates are used. Some of the soluble sulphur is made insoluble, and there is a tendency to increase the soluble arsenate in the mixture. The actual reactions that occur are discussed. As a result of these changes, which are complete after 24 hours, the fungicidal value of the mixture is probably greatly lessened and the danger to the foliage increased. The addition of hydrated lime at the rate of 10 or 5 lb. per 100 U.S. gals. of mixture completely stops all reactions, but owing to the increased amount of solid material the spray becomes more difficult to use. Various other substances were tried, but only those containing casein had the desired effect. Pure casein prevented these changes when used at the rate of 4 oz. to 100 U.S. gals. of the mixture. A commercial calcium caseinate preparation known as "Kayso" produced the desired result when used at the rate of ½ lb. to 100 U.S. gals. A slight scorching of foliage was noticed under orchard conditions, so that some additional testing of this material may be necessary. The casein may be added to either the lime-sulphur or lead arsenate or the mixture, but it must be worked up into a smooth paste before adding to other materials.

The question as to whether the presence of the protective colloidal casein material in the mixture will in any degree lessen the insecticidal or fungicidal efficiency of the other ingredients can only be determined by actual spraying experiments.

HARTZELL (F. Z.). **Grape Insects.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 78–87. Rochester, N.Y., 1924.

The three most generally distributed vine pests in New York State are *Erythroneura comes*, Say (grape leafhopper), *Haltica chalybea*, Illiger (vine flea-beetle) and *Macrodactylus subspinosus*, F. (rose chafer). Their life-history and habits are described and the recent developments in remedial measures are discussed.

In the case of *E. comes* large infestations may be prevented to a considerable extent by clean cultivation. In infested vineyards it is advisable to allow all sucker growth around the base of the plant to remain until about the middle of July or just previous to spraying. The leafhoppers seek the lowest foliage, and the more permanent leaves are thus protected. From 80 to 90 per cent. of the nymphs may be destroyed by the application of nicotine sulphate ½ U.S. pint to 100 U.S. gals. Bordeaux mixture or water with the addition of 8 to 10 lb. of hydrated lime. This must be applied at the rate of at least 150 gals. per acre and with a pressure of from 150 to 300 lbs. It must be applied to the lower surface of the foliage, between the time of the hatching of the eggs and the emergence of the adults, with a trailing hose or special attachment. Dusting is not recommended in western New York, as the essential conditions for the success of this treatment are very difficult to secure at the susceptible stage of the pest.

Infestation by *H. chalybea* may be reduced by the destruction of all wild grape-vines growing near the vineyard, especially to the south and south-west. The beetles feeding on the swelling buds may be destroyed by jarring them into pans on the bottom of which is a shallow layer of kerosene.

The larvae of *M. subspinosus* in grass fields may be destroyed by breaking up the sod and planting a cultivated crop such as maize or early potatoes. The regular cultivation destroys the pupal cells. Sprays consisting of lead arsenate paste 10 lb., confectioners glucose 25 lb. or 2 U.S. gals. molasses, and 100 U.S. gals. water applied as soon as the adult beetles appear have given good results. The spray may have to be repeated if washed away by rain.

McLeod (G. F.). **The Fruit Tree Leafroller in New York.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 95–104. Rochester, N.Y., 1924.

Tortrix (*Archips*) *argyrospila*, Wlk. (fruit-tree leafroller) has become one of the most serious orchard pests during the last few years. Its life-history and habits as well as experiments with regard to control are discussed. The remedial measures recommended are similar to those described by other workers [*R. A. E.*, A, xi, 448]. The application of miscible oil, however, is not considered advisable unless injury by the pest is in excess of 20 per cent. of the fruit when harvested, and then it should only be made with extreme caution. Under average conditions a lead arsenate spray with an adhesive such as glue or casein should be used. The time of application is of great importance, and it is best to keep the foliage well covered from the time the leaf buds unfold until the petals fall. The amount must vary with the age and type of tree, but as a rule $\frac{1}{8}$–$\frac{1}{2}$ more than the usual amount used under ordinary conditions will be required. A pressure of at least 250–300 lb. should be maintained to avoid waste.

Parrott (P. G.). **Some Sidelights on Dusting and Spraying Practices.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 118–134. Rochester, N.Y., 1924.

The results of the spraying and dusting experiments carried out during the past season are reviewed. On the whole sprays containing lead arsenate were slightly more effective against codling moth [*Cydia pomonella*, L.] than similar dusts, though both greatly reduced the number of infested apples. Though oil emulsions are very effective against the San José scale [*Aspidiotus perniciosus*, Comst.], their use should be limited to particularly heavily infested old orchards, lime-sulphur solutions being of more general practical value under ordinary circumstances.

The addition of calcium caseinate to lime-sulphur solutions intended for use against codling moth and apple scab appears to improve the spreading properties of the solution, but does not increase the insecticidal value of the spray. The results of experiments against the pear psylla [*Psylla pyricola*, Först.] further prove the susceptibility of the adults to nicotine dusts, provided the work is thoroughly carried out under favourable conditions. Under such conditions very few of the adults dislodged from the trees recovered from the treatment.

Nicotine dusts are not very satisfactory against the rosy apple aphis [*Anuraphis roseus*, Baker], and if used should be applied when the blossom buds are in the pink stage, as the Aphids are most susceptible at this period. The usual delayed dormant spray is, however, considered the most effective method of combating this pest.

MUNDINGER (F. G.). **Experiments with Calcium Cyanide as an Insecticide.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 134–138. Rochester, N.Y., 1924.

Calcium cyanide, one part to three parts of ground talc as a carrier, appears to be as effective as a 2 per cent. nicotine dust for the control of the pear psylla [*Psylla pyricola*, Först.] and the grape leafhopper [*Erythroneura comes*, Say], and if carefully applied will not injure the pear or grape foliage.

Experiments with granular calcium cyanide as a soil fumigant gave promising results against pear thrips [*Taeniothrips inconsequens*, Uzel] and the apple maggot [*Rhagoletis pomonella*, Walsh]. The cyanide was scattered on the ground, and worked in an inch or more with a rake.

FELT (E. P.). **The Gipsy Moth in New York State.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 166–167. Rochester, N.Y., 1924.

This summary of a paper briefly reviews the present situation with regard to the gipsy moth [*Porthetria dispar*, L.] in the United States, the importance of stopping further spread being again emphasised [*cf. R. A. E.*, A, xii, 170].

STRICKLAND (L. F.). **Round Table Conference on Pear Psylla.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 184–192. Rochester, N.Y., 1924.

In opening a discussion on the control of the pear psylla [*Psylla pyricola*, Först.] the author gives an outline of experiments that have been carried out, and recommends particularly the pruning of all trees, which should be kept at a height of about 12 feet. By this means thorough and economic spraying and dusting is possible. The trees must be well covered with the spray or dust, mature trees pruned as suggested requiring about 5½ U.S. gals. of spray or 1 lb. dust for each application. Sprays should be applied for the soft-shell nymphs and dusts for the hard-shell nymphs and adults. Sprays are recommended for small orchards and dusts for large ones. A lime-nicotine dust with at least 2 per cent. available nicotine should be used. Applications should be made when the temperature is 65°F. or above, starting on the leeward side of the orchard.

As a spray for pears in leaf the following formula is recommended: copper sulphate (blue vitriol) 2 lb., hydrated lime 40 lb., 40 per cent. nicotine sulphate 1 U.S. pt., and water 100 U.S. gals. The copper sulphate should be omitted when spraying for the second brood nymphs.

LATHROP (F. H.). **Fall Spraying for the Pear Psylla.**—*Proc. 69th Ann. Meeting New York State Hortic. Soc.*, pp. 205–209. Rochester, N.Y., 1924.

The pear psylla [*Psylla pyricola*, Först.] can only be successfully controlled by the application of well-timed sprays against the various stages. The following spray schedule is recommended: egg spray, lime-sulphur solution 1–8 applied as the blossom buds are spreading in the clusters; nymph spray, 30 to 40 lb. lime, 2 lb. copper sulphate, 1 U.S. pint nicotine sulphate (40 per cent.) and water up to 100 U.S.

gals., applied in the spring and again in the summer [*cf.* preceding paper] when the nymphs are abundant (the addition of 2½ lb. lead arsenate forms the standard calyx application); and nicotine sprays and dusts as summer treatment against the adults. In hibernation the adults are susceptible to autumn sprays of nicotine and soap, and to spring sprays of soap, nicotine, and miscible oils. Details are given of experiments with these various substances, as a result of which their use is recommended in cases where a heavy infestation is present in spite of the application of the routine sprays. The best time for autumn spraying is in the latter half of November. The thoroughness of the application and the prevailing weather conditions are important factors influencing the value of this treatment.

PETTIT (R. H.). **The Chinch Bug.**—*Michigan Agric. Expt. Sta.*, Circ. Bull. 51, 2 pp., 2 figs. [East Lansing, Mich.] August 1922. [Received 2nd May 1924.]

The barrier method of combating the chinch bug [*Blissus leucopterus*, Say] is described [*R. A. E.*, A, viii, 504, etc.].

PETTIT (R. H.). **Report on the Section of Entomology.**—*61st Ann. Rept. State Bd. Agric. Michigan, 1921–22*, pp. 211–214. East Lansing, Mich., 1923. [Received 2nd May 1924.]

A remarkably severe infestation of *Heliothis obsoleta* (corn-ear worm) occurred in Michigan in 1921, all kinds of maize being destroyed. During the autumn *Laphygma frugiperda* (fall army worm) was also very destructive to maize crops and to beans, of which the pods were eaten into and the contents of the seeds scooped out. The apple-seed Chalcid, *Syntomaspis druparum*, appeared in limited numbers for the first time in the State. The larvae pass the winter in fallen apples and in the spring oviposit in the small apples of the next season. All fallen apples should be destroyed before winter. *Loxostege similalis* (garden webworm) was more than usually troublesome in lucerne fields. If the land is rolled many larvae are killed without injuring the young plants. The areas that have suffered most and longest from grasshoppers are showing marked improvement, and the numbers of blister-beetles are increasing. GORDIINAE (hair worms) are also destroying numbers of *Melanoplus femoratus*. The grape leafhopper, *Erythroneura* (*Typhlocyba*) *tricincta*, was very abundant. The destruction of its winter quarters, fallen leaves, rubbish, etc., is advocated, though a thorough spraying with one or more applications of Bordeaux and nicotine sulphate is sometimes sufficient, the first application being made just before the nymphs become winged. The grape-berry moth [*Polychrosis viteana*] was also troublesome, and has been steadily increasing for a number of years. Kedzie mixture [*cf. R. A. E.*, A, x, 478] and Bordeaux are recommended as a remedy, the number of applications depending on the gravity of the attack, but there should always be a spray 3 or 4 days after blooming and another when the grapes are about the size of buck-shot, and before they touch in the cluster, so that it is possible to coat each berry with poison on all sides. Paradichlorobenzene is now the accepted remedy for peach-tree borer [*Aegeria exitiosa*]. Maize was attacked by termites that were breeding in decaying stumps in the field. Information regarding the potato leafhopper [*Empoasca mali*] and the flat-headed apple-tree borer [*Chrysobothris femorata*] is the same as last year [*R. A. E.*, A, xi, 106].

Two new pests of fruit have occurred during the year, *Contarinia johnsoni* (grape-blossom midge), which destroys the grape in the bud stage, and *Rhynchaenus* (*Orchestes*) *canus* (apple flea weevil), which eats small pits in the foliage of apple. Aphids were abundant, especially *Colopha ulmicola*, causing cockscomb gall of elm, and *Acyrthosiphon* (*Macrosiphum*) *pisi* (pea aphis), which develops on clover and migrates to peas. The discovery of a cheaper killing agent than the usual nicotine dusts against these Aphids is greatly to be desired.

Halligan (C. P.), Pettit (H. R.) & Coons (G. H.). **Spray and Practice Outline.**—*61st Ann. Rept. State Bd. Agric. Michigan, 1921–22*; also *Michigan Agric. Expt. Sta.*, Spec. Bull. 114, pp. 405–429, 9 figs. East Lansing, Mich., 1923. [Received 2nd May 1924.]

Suitable sprays are recommended for use in Michigan against the pests of the principal fruit crops, etc., with instructions for the preparation of spray mixtures, poison bran, and other insecticides.

Bondar (G.). **Aleyrodideos do Brazil, ou piolhos "farinheiros" das plantas.**—*Chacaras e Quintaes*, xxix, no. 4, pp. 353–357, 5 figs. S. Paulo, 15th April 1924.

After a brief account of the bionomics and economic importance of the Aleurodidae, notes are given on the more important species in Brazil. Chief among these is *Aleurothrixus floccosus*, Mask., probably indigenous on Myrtaceae and Rubiaceae, etc., prior to the introduction of the orange. It is also a pest of coffee in the state of Bahia. *A. aepim*, Goeldi, infests "aepim" [*Manihot palmata*] and cassava [*M. utilissima*]. Coconuts on the coast are infested by many species [*R. A. E.*, A, xi, 121], but only one, *Aleurotrachelus atratus*, Hemp., is of consequence; it causes the leaves to turn yellow. *Aleurodes brassicae*, Wlk., is a pest of cabbages.

Margarinos Torres (A. F.). **Um temivel inimigo da pomicultura, *Cydia* (*Carpocapsa*) *pomonella*, L.** [A terrible Enemy of Apple-growing.]—*Chacaras e Quintaes*, xxix, no. 4, pp. 358–359. S. Paulo, 15th April 1924.

In this appeal to Brazilian agriculturists to second the work of the Government quarantine service [established December 1921], the extent of the ravages of *Cydia pomonella*, L., is depicted. This pest has just been found in a large shipment of fruit from the Argentine, and the same shipment included fruits attacked by *Aspidiotus perniciosus*, Comst.

Silvestri (F.). **Descripción de un nuevo género y tres especies nuevas de Ortheziinae (Hemipt., Coccidae) de España y de Costa Rica.** [Descriptions of a new Genus and three new Species of Ortheziinae from Spain and Costa Rica.]—*Bol. R. Soc. esp. Hist. nat.*, xxiv, pp. 169–176, 9 figs. Madrid, 1924.

Descriptions are given of *Orthezinella hispanica*, gen. et sp. n., taken in Spain under stones, and *O. neotropicalis*, sp. n., and *Ortheziola tristani*, sp. n., both taken in Costa Rica in the ground.

WILLIAMS (C. B.). **The Pink Bollworm in Egypt in 1922.**—*Minist. Agric. Egypt, Cotton Res. Bd., 3rd Ann. Rept., 1922*, pp. 1–8, 2 figs. Cairo, 1924.

A general account is given of the pink bollworm [*Platyedra gossypiella*, Saund.] in Egypt, and the present situation with regard to its control is outlined. Since this moth was first discovered in 1910, the loss in Egypt from its depredations is estimated at about £50,000,000, while at least an equal sum is considered to have been saved by the present remedial measures. The life-history is shown in two diagrams, the first as it would be without any remedial measures, the second showing the effect of the measures now practised. The factors determining the larval resting stage seem to be a combination of food, temperature, moisture and rhythm, but are being further investigated. At the end of August there are larvae (mostly short-cycle) in bolls on the plants and a few in fallen bolls on the ground. In September the first picking takes place and many larvae, including a few long-cycle ones, are picked with the lint, some bolls containing larvae fall to the ground and some are trampled beneath the surface by the pickers. From the beginning of October the number of long-cycle larvae increases rapidly, and in the second picking of the month an enormous number of double seeds containing larvae is carried with the lint to the villages and ginneries. A third picking may be taken, but usually by mid-November there are only dead bolls, containing many resting larvae and a few short-cycle ones, on the cotton sticks. These sticks are collected and kept in heaps in factories and on the roofs of village houses to be used as fuel, and many bolls containing larvae are dropped in the fields and along the roads to the villages. All these are sources of infestation for the next year. Breeding records show that emergence of moths from bolls lying on the ground is earlier than from bolls on roofs, etc. This is probably due to the dry condition of the latter, and increases their importance, as all moths emerging from them find bolls on which to oviposit. The bolls lying on and under the ground probably constitute the chief danger at the present time, owing to the difficulty of dealing with them. Many short-cycle moths hatch out from the picked cotton before ginning and fly back to the fields. The prompt heating of the seed, which is now compulsory in every ginnery, probably destroys over 99 per cent. of resting larvae in the seed. A law was passed ordering all cotton of the previous crop to be ginned by 30th April and the ginneries to stop working from that date until the new crop arrived. This caused so much loss that the law was suspended in 1921 and 1922, but it was noticed that the attack in 1921 was more severe than in the three preceding years. With regard to the sticks stored for fuel, complete removal of all bolls from the sticks before their transport from the fields has been insisted upon, but this has been impossible to enforce owing to the number of small cultivators. It has been suggested that all fuel not consumed by the end of April should be burnt, but the difficulty of inspection of roofs and of removing sticks for burning without shedding bolls by the way is too great. Another method suggested is to make compulsory the production of a certain number, volume or weight of dead bolls proportionate to the acreage. The larvae remaining in the field are still the chief source of infestation, and it is hoped to find some improved method of dealing with them.

An investigation is being made into the relation between the percentage infestation of green and open bolls in the field at various dates and places; the ratios of damaged cotton and damaged seeds in

various parts of the country in different years ; and the ratio of pickable to unpickable cotton. From these it is hoped to deduce mathematical laws from which the damage due to *P. gossypiella* can be calculated after the crop is picked, or perhaps even in advance. The influence of environment on the long-cycle larvae is also being studied, and the possibility of causing the moths to emerge earlier in the year before bolls appear on the new cotton. Evidence indicates that pupation of the long-cycle larvae is largely controlled by temperature and humidity, and this might possibly be induced in the field by irrigation. The discovery of a variety of cotton that would give an earlier crop would also reduce the damage enormously.

Prodenia litura, F. (cotton worm) occurred locally throughout Egypt, the maximum attack being from 15th June to 7th July and lasting until the end of August. Although no appreciable damage was done, the insect must be considered a menace to the cotton crop. It was noticed that severe infestation always followed the appearance of numbers of the larvae in adjacent fields of berseem [*Trifolium alexandrinum*], which, either from heavy watering or late rain, remained in a favourable condition for the development of the pest. The most important preventive measure, therefore, is cessation of irrigation of berseem after certain dates. Berseem that contains fully developed larvae should be cut immediately and their escape to adjacent cotton prevented.

Entomological Section.—*Minist. Agric. Egypt, Cotton Res. Bd., 3rd Ann. Rept. 1922*, pp. 59–66. Cairo, 1924.

In attempting to estimate the attack of the pink bollworm [*Platyedra gossypiella*, Saund.] in green bolls, the examination has been carried out as in previous years [*R.A.E.*, A, xi, 96 ; xii, 196], and tables show the percentage of sound bolls in the different regions. All open bolls in one experimental area were taken to the experiment station and examined twice weekly, and a table shows the findings. It was found that even parts of the same area differed very much with regard to total production, earliness and bollworm attack. It has been shown that a definite relation does exist between the percentage damage in open bolls and that in the seeds from the bolls, and work will be continued to determine how far this relation holds for other localities in other years. Experiments are also in progress to test the difference in the survival of resting larvae under different winter crops. The results at present indicate a greater survival nearer the surface and in dry crops than at greater depths and in wet crops. Berseem [*Trifolium alexandrinum*] planted after cotton may therefore be much better in reducing the numbers than other crops, such as wheat, that require less water. The statistics of working of the ginneries in treatment against *P. gossypiella* are given ; taking the whole year into consideration there seemed to be a distinct improvement in the regulation of the machines, the samples that contained live larvae having materially diminished.

Miles (H. W.). **The Mustard Beetle.** *Phaedon cochleariae*, **Fab.** *Phaedon armoraciae*, **Linn.**— *Ann. Rept. Kirton Agric. Inst. 1923*, pp. 43–45. Kirton, Lincs., March 1924.

Phaedon cochleariae, F., and *P. armoraciae*, L. (mustard beetles) are very common in parts of Lincolnshire on cruciferous crops, being

chiefly destructive to mustard, but occurring also in fields of turnips and swedes. There are several generations annually. The beetles feed chiefly on the lower surface of the leaves. Eggs are generally laid singly on the backs of the leaves, in shallow depressions eaten out by the female. They hatch in from 6 to 8 days, and the larvae feed on the leaves, leaving the upper epidermis intact. When fully fed the larvae descend to the ground, pupating about 1½ in. below the surface ; the pupal stage lasts from 7 to 10 days. The last generation of beetles hibernates in hollow stalks, stubble, hedge-side refuse, thatched roofs, stacks, etc. ; one field of mustard stubble was estimated to contain about 100,000 beetles per acre. Instead of cutting and ploughing such stubble, it should be pulled and burnt, together with hedge brushings and coarse herbage from dyke sides. When migration of the beetles is observed from mustard or swede seed crops to summer cabbage and cauliflowers, a shallow trench cut across the line of march and filled with tar will trap numbers of them. Experiments with sprays are in progress.

Miles (H. W.). **The Diamond-back Moth,** *Plutella maculipennis*, **Curt.**— *Ann. Rept. Kirton Agric. Inst. 1923*, pp. 45–48. Kirton, Lincs., March 1924.

Plutella maculipennis, Curt. (diamond-back moth) was a serious pest of cruciferous crops in Lincolnshire in 1923. The moths are on the wing in July and oviposit on the lower surface of the leaves. The larvae eat holes and mine in the leaves, and later devour them in irregular patches. When fully fed they pupate in cocoons on the backs of leaves or on dead leaves and rubbish on the ground. The moths from these pupae give rise to another generation that apparently hibernates in the pupal stage in rubbish, dead leaves, etc. Weather conditions greatly influence the numbers ; rain is very detrimental to the larvae ; natural enemies include birds (particularly sparrows) and insect parasites, the second generation in 1923 being practically destroyed by *Angitia fenestralis*, Holmgr. A hyperparasite, *Mesochorus* sp., also occurred.

Miles (H. W.). **The Cabbage Root Fly** (*Chortophila brassicae*, **Bouché**). — *Ann. Rept. Kirton Agric. Inst. 1923*, pp. 48–51, 1 fig. Kirton, Lincs., March 1924.

Phorbia (*Chortophila*) *brassicae*, Bch., was very prevalent in Lincolnshire in the summer and autumn of 1923, an interesting phase of the attack on cauliflowers being infestation of the developing heads, resulting in the formation of loose heads unfit for market. The life-history of this fly and the damage usually caused by it are described. Attacks on the upper part of cabbages have occasionally been reported in the past ; the female probably oviposits in the small accumulations of soil commonly found in the leaf axils of the plant after rain, and the larvae bore straight into the stems. Other Cruciferae also have been attacked and occasionally ornamental plants, such as stocks. Adverse weather conditions (such as cold, wet springs and hot, dry oviposition periods) reduce the numbers considerably, while larvae of the Staphylinid, *Aleochara bilineata*, Gyll., are predacious on the pupae of this fly. The remedies suggested are cultivation of the soil to expose the eggs to the heat of the sun, and treatment with mercury bichloride [*R. A. E.*, A, xi, 235, etc.].

Petherbridge (F. R.). **Apples attacked by the Larvae of the Dock Sawfly** (*Ametastegia* (*Taxonus*) *glabrata*, **Fallén**).— *Ann. App. Biol.*, xi, no. 1, pp. 24–30, 3 figs. Cambridge, April 1924.

Apples in East Norfolk have been found with small holes bored into them by larvae of the sawfly, *Ametastegia glabrata*, Fall., in the manner previously described in America [*R. A. E.*, A, v, 241]. The holes thus made provide easy entrance for fungi, and many fruits begin to rot round the holes. There are two generations annually, the first generation larvae appearing in June and July and the second from August to September, the latter generation apparently being the larger. The life-history and habits and the stages of this sawfly are described. As the larvae feed almost entirely on docks and *Polygonum* and not on apple foliage, it is not likely to become a serious pest. Clean cultivation of the orchard and suitable banding are again suggested [*loc. cit.*].

Cunliffe (N.). **Further Observations on the Prevalence and Habits of *Oscinella frit*, Linn.**— *Ann. App. Biol.*, xi, no. 1, pp. 54–72, 3 charts. Cambridge, April 1924.

Observations on the prevalence and habits of *Oscinella frit*, L. (frit fly) have been continued during 1919–1922 [*R. A. E.*, A, ix, 533]. There are 3 generations annually ; the third is abundant in the adult stage from the end of April to mid-June, with maximum numbers about 26th May ; the first from the end of May to mid-August, with maximum about 15th July, and the second from the end of July to the beginning of September (or longer), with maximum about 19th August. Meteorological conditions varied considerably during the years in question, but were not sufficiently diverse to affect the periods of prevalence of the fly to any great extent. This may be owing to the fact that the larva is an internal feeder. The migration of the third generation in spring from wild grass to oats is independent of the state of the crop's growth, and the maximum infestation is fairly constant in time. This is important in relation to the yield of the plant. The state of the crop only influences the extent of attack (from the point of view of yield) through variation in susceptibility. A study of the charts indicates that prevalence of the fly in August is dependent on grasses as well as on oats. It appears that the fly will utilise oat stems or grain if available at the right time, and if not, it attacks suitable wild or cultivated grasses. The action of the larvae on the food-plant is described ; they show a strong tendency to attack those parts of the plant that are abundantly supplied with sap.

Withycombe (C. L.). **Note on the Economic Value of the Neuroptera with Special Reference to the Coniopterygidae.**— *Ann. App. Biol.*, xi, no. 1, pp. 112–125, 1 pl. Cambridge, April 1924.

The author in his summary of this paper lists three families of Neuroptera as being of economic importance in Britain ; the Coniopterygids, Hemerobiids, and Chrysopids. The Coniopterygids are far more common in England than is generally supposed. The eggs are laid at the edges of leaves. The larvae are predacious ; those of the genus *Conwentzia* are very beneficial on oaks in England, where they prey upon small Rhynchota, such as *Phylloxera punctata*, Licht., and mites. They would seem to lend themselves particularly well to utilisation in

biological control and might be introduced into peach houses in England. Six imagines of *Conwentzia psociformis*, Curt., released upon a pear tree infested with the mite, *Bryobia praetiosa*, Koch, resulted in roughly 1,000 individual cocoons at the end of the season of 1921. *Conwentzia* could probably be introduced successfully into other countries where the genus does not occur, but its parasites (particularly the Chalcids, *Lygocerus* sp. and *Ceraphron* sp.) would have to be strictly guarded against.

The Hemerobiids are more often found in woods than elsewhere in Britain. Some prefer conifers, others deciduous trees. *Boriomyia subnebulosa*, Steph., is common in orchards and gardens near London.

The larvae of Chrysopids, like those of Hemerobiids, show preferences for different trees according to species. *Chrysopa prasina*, Burm, is a valuable check on *Chermes* spp. on conifers ; and *C. tenella*, Schn., and *C. septempunctata*, Wesm., feed on various orchard and garden insects, including *Eriosoma lanigerum*, Hausm., infesting apple ; while *C. phyllochroma*, Wesm., often occurs in bean-fields in some localities, its probable food being *Aphis rumicis*, L., which is also sometimes attacked by *C. septempunctata*.

Cook (W. C.). **A Note on Cutworm Bait Experiments.**—*Ann. App. Biol.*, xi, no. 1, p. 126. Cambridge, April 1924.

With reference to a recent paper on poison bait for cutworms [*R. A. E.*, A, xi, 463], the author describes a method of testing the value of various baits in this connection that has proved entirely reliable. The method followed was to liberate a given number of larvae in the centre of a circle, around the circumference of which were placed alternating piles of two unpoisoned baits to be tested. In practice, 16 piles of the baits, spaced evenly around the periphery of a circle 2 ft. in diameter, were found to be sufficient to give good results. The cage was darkened and record was made of the number of larvae feeding on each bait after half an hour or so. It was found necessary to place each pile of bait on a paper and to place a pile of loose sand in the centre of the circle to eliminate such larvae (usually nearly half the total number) as were seeking shelter and not food.

Collinge (W. E). **The Food and Feeding Habits of the Blackbird.**—*Jl. Minist. Agric.*, xxxi, no. 2, pp. 182–186. London, May 1924.

There is a decided variance of opinion as to whether the blackbird (*Turdus merula*) is beneficial or injurious to fruit culture. As a result of the examination of the stomach contents of 285 specimens it was found that 39 per cent. of the total food consumed during the year is of animal nature and the remainder vegetable matter. The blackbird is becoming increasingly abundant, and until its numbers are greatly reduced it cannot be considered as a neutral or beneficial factor.

Ludwigs (K.). **Zur Bekämpfung des Apfelblattflohs** (*Psylla mali*). [The Control of the Apple Psyllid, *P. mali*.]—*Deutsche Obst- u. Gemüsebau-Ztg.*, lxx, no. 14 b, pp. 147–149, 2 figs. Eisenach, 7th April 1924.

F *Psylla mali* has increased in recent years in fruit-growing areas in Germany. The larvae hatch in spring and penetrate between the

young leaves of the opening buds and prevent normal development of both leaves and blossoms. Owing to the hairiness of the apple leaves it is difficult to get a spray to penetrate. After preliminary tests of Theobald's mixture in 1921, further experiments were made in the spring of 1923. This insecticide contains 20–25 lb. burnt lime, 10–12 lb. common salt and 1 lb. water-glass (sodium silicate) in 20 gals. water. It destroys the eggs and is a practical remedy of reasonable cost that deserves to be very widely known. The water-glass is an important constituent. Destruction of the eggs is considered preferable to any attempt to kill the larvae. Fruit-tree carbolineum is considered too variable in its effects to be entirely reliable.

LEHMANN (H.). **Ein weiterer Beitrag zur Bekämpfung des Apfelwicklers.** [A further Contribution to the Control of the Apple Moth.]—*Deutsche Obst- u. Gemüsebau-Ztg.*, lxx, no. 14 b, pp. 150–151. Eisenach, 7th April 1924.

In infestations by apple moth [*Cydia pomonella*] the author does not agree with Gleisberg that the fall of fruits is largely a physiological matter [*R. A. E.*, A, xi, 401]. If collection is done several times a week and finally once daily, it will be found that at first the fruits are nearly all sound and that later on both sound and infested examples occur until finally the latter predominate.

In 1922 the moths appeared between 18th May and 9th July, and in 1923 between 26th April and 3rd July. A supposed 2nd generation observed by some growers in North Germany consists merely of stragglers. Moths are still on the wing at the end of July, and their larvae occur in fruits plucked at the end of September.

GLEISBERG (W.). **Zur Madenfallenfauna.** [The Fauna of Caterpillar Traps.]—*Deutsche Obst- u. Gemüsebau-Ztg.*, lxx, no. 14 b, pp. 151–152. Eisenach, 7th April 1924.

Traps consisting of shelter bands are a valuable means for combating various pests of fruit trees. A table is given showing the captures made in bands on 28 trees. Injurious Arthropods totalled 36·8 per cent., harmless species 10·3 and beneficial ones 52·9. Of the last-named the majority were spiders, which would escape when the banding is removed. The pests, numbering 706 in all, were *Cydia pomonella* 656, *Anthonomus pomorum* 24, *A. cinctus* 10, *Cossus cossus* 13, and *Porthetria dispar* 3.

STELLWAAG (F.). **Die Benetzungsfähigkeit verschiedener Bekämpfungsmittel gegen Obstbauschädlinge.** [The Wetting Power of various Insecticides for Fruit Tree Pests.]—*Deutsche Obst- u. Gemüsebau-Ztg.*, lxx, no. 14 b, pp. 152–153. Eisenach, 7th April 1924.

Various insecticides have been tested as regards wetting power by means of an apparatus devised by the author [*R. A. E.*, A, xii, 54]. An angle of 180° indicates complete lack of wetting power while 0° indicates

perfect wetting power. Water was just able to wet leaves, the angle varying from 90° for cherry, plum and some apples, to 155° for snowberry.

Several contact poisons were tested, including lime-sulphur and various brands of carbolineum and of proprietary insecticides. In the usual dilution these failed to wet satisfactorily dense colonies of woolly aphis [*Eriosoma lanigerum*], but were more effective with weaker infestations of the same pest. A soap that has a good wetting power and was used here for comparison, behaved in the like fashion in dilutions of ½–1 per cent. These results agree with those obtained by spraying under field conditions. Among the readings shown in a table of results with apple bark are those of 25°–44° for carbolineum and 90° for lime-sulphur and soap. Such considerable wetting power as is shown by a 25°–44° angle fails, however, in case of dense infestation, unless a very powerful jet is used or unless the solution is put on with a brush. With mechanical assistance it becomes more or less indifferent what solution is used and one of slight wetting power may prove quite effective if thoroughly applied. Lime-sulphur behaves like water and needs a powerful jet on hairy leaves.

Gleisberg (W.). **Bewährung von Raupenleimen.** [Tests of Banding Adhesives.]—*Deutsche Obst- u. Gemüsebau-Ztg.*, lxx, no. 14 b, pp. 154–155. Eisenach, 7th April 1924.

The results of tests of 11 German brands of banding adhesives are given. The good samples remained effective for many months. As the smell of the material seems to cause many of the females of *Cheimatobia brumata* and *Hybernia defoliaria* to stop ascending the trunk and to oviposit beneath the bands, fruit tree carbolineum should be applied to these spots in spring to destroy the eggs and young larvae.

Kessler (—). **Beobachtungen über die Wirkung verschiedener Bekämpfungsmittel.** [Observations on the Action of various Insecticides and Fungicides.]—*Deutsche Obst- u. Gemüsebau-Ztg.*, lxx, no. 14 b, pp. 155–156. Eisenach, 7th April 1924.

Benzol [C_6H_6] with the addition of a little oil paint has proved very effective against the woolly apple aphis [*Eriosoma lanigerum*]. One yearly application with a brush is sufficient to free the trees and keep them free. A 10 per cent. carbolineum spray applied just before the blossoms open reduces Aphids on the foliage to a negligible degree. The application of collars is the best means of preserving cabbages from the cabbage fly [*Phorbia brassicae*].

Gleisberg (W.). **Keimschädigung durch Erbsenkäfer und Erbsenwickler.** [Germ Injury by *Bruchus pisorum* and *Cydia* spp.] —*Deutsche Obst- u. Gemüsebau-Ztg.*, lxx, no. 14 b, p. 158, 1 fig. Eisenach, 7th April 1924.

Besides damaging the quality of dried and tinned peas, infestation by *Bruchus pisorum* (*pisi*) and *Cydia* (*Grapholitha*) *dorsana* and *C.* (*G.*) *nebritana* reduces the germinating power of peas very considerably. In one case only 35 peas (2·4 per cent.) germinated out of 1,472, of which 943 were infested by the Bruchid and 529 by the moths. Before

sowing, peas should be thrown into water which should be kept stirred, so that all peas useless for planting float to the surface.

DYCKERHOFF (F.). **Die Rübenblattwanze.** [The Beet Leaf Bug.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugbl. 73, 4 pp., 5 figs. Berlin, April 1924.

The Tingid, *Zosmenus capitatus*, Wolff, which is generally a harmless species infesting orache [*Atriplex*], has of recent years become a serious pest of sugar and fodder beet in some parts of Germany. A brief account of its life-history and control are given [*R. A. E.*, A, x, 501, 504]. Advice on the latter, differing somewhat from that in the papers referred to, is as follows: Beet should not be grown in fields adjoining uncultivated land, meadows or clover-fields, and all borders must be kept clean. If such positions are inevitable, a protective belt 30–60 ft. wide and planted with oats, potatoes or mustard should be interposed. The rows of beet near the winter quarters of the bug may be used as traps, which must be ploughed under, harrowed, rolled and planted with another crop when a sufficiently large number of eggs are seen on them. Severely infested fields must be treated in the same way. If an outbreak is expected, sowing should be delayed, until the end of May or early June if possible. Where outbreaks are endemic, beet cultivation must be given up for some years.

ZACHER (F.). **Der Birnenblasenfuss** (*Taeniothrips inconsequens* **Uzel**= *Euthrips pyri* **Daniels**), **ein neuer deutscher Obstschädling.** [The Thrips, *T. inconsequens*, a new German Fruit Pest.]—*Nachrichtenblatt deutsch. Pflanzenschutzdienst*, iv, no. 5, pp. 29–30, 3 figs. Berlin, 1st May 1924.

The pear thrips, *Taeniothrips inconsequens*, Uzel, is a serious pest of fruit in the United States. There are only a few European records—from Bohemia, England, Denmark, Norway and the Crimea, and it is only in the two last that it has done any real harm. Its habits are probably responsible for no record having been made in Germany until recent years, since when the author has noticed it quite frequently on apple and pear buds in Prussia. It is probably widespread in Germany and responsible for injury ascribed to other causes.

MEYER (R.). **Starkes Auftreten der Sattelmücke** *Clinodiplosis equestris* **Wagner.** [Outbreaks of *C. equestris*.]—*Nachrichtenblatt deutsch. Pflanzenschutzdienst*, iv, no. 5, pp. 31–32. Berlin, 1st May 1924.

Clinodiplosis equestris, Wagner, has done noticeable injury to wheat in Germany during the past few years [*cf. R. A. E.*, A, x, 16]. At the end of July or early in August the topmost leaf-sheaths are swollen in an abnormal manner by the infestation of the larvae within, forming a kind of gall. When the haulm withers, these galls dry and the larvae migrate to hibernate in the ground. In fine weather the growth of infested stems is actually promoted by the increased flow of sap to the haulms, but if the season is wet, the affected portion is unable to withstand agencies causing decomposition, and the haulms rot. This midge appears to be a secondary pest following diseases or injury by hail.

FABRE (J. H.). **Note au sujet des arséniates de plomb.**—*Progrès agric. & vitic.*, lxxxi, no. 18, pp. 417–420. Montpellier, 4th May 1924. Also in *Rev. Agric. Afr. N.*, xxii, no. 249, pp. 305-307. Algiers, 9th May 1924.

The various arsenical derivatives are discussed, of which orthoarsenic produces the arsenates used in agriculture. These may be either monoplumbic, diplumbic or triplumbic orthoarsenates. The diplumbic orthoarsenate, $PbHAsO_4$, and the triplumbic orthoarsenate, $Pb_3(AsO_4)_2$, appear to have the greatest insecticidal value, preference being given to the diplumbic orthoarsenate by entomologists. The author considers, however, that the superiority of this substance cannot have been chemically proved, in view of the fact that no method of obtaining a definitely pure form of lead arsenate is known. When a solution of sodium arsenate is mixed with one of a soluble lead salt (lead acetate or nitrate), it forms a precipitate consisting of a mixture of diplumbic and triplumbic orthoarsenates and free acid arsenic. Moreover no process of analysis is known to enable the respective proportions of diplumbic and triplumbic arsenates to be differentiated.

T[RABUT] (L.). **Une nouvelle cochenille dangereuse dans les Alpes maritimes.**—*Bull. agric. Alg.-Tun.-Maroc*, xxx, no. 4, pp. 81–83, 2 figs. Algiers, April 1924.

The Coccid, *Diaspis pentagona*, has recently appeared in a fresh locality, near Nice. Its history in other countries is briefly recorded, and the value of the Chalcid, *Prospaltella berlesei*, in Italy and of the Coccinellid, *Chilochorus kuwanae*, in Japan (also introduced into Italy) in its suppression, is discussed.

The precautions that should be taken in Algeria against the introduction of such Coccids include the prohibition of import of mulberry trees from Italy, and limitation of import of stone fruits, such as peaches and plums. Importations from Japan should also be considered dangerous.

GENIEYS (P.) **Les Vers des tiges du Maïs.**—*Bull. agric. Alg.-Tun.-Maroc*, xxx, no. 4, pp. 85–86. Algiers, April 1924.

This account of *Sesamia vuteria*, Stoll (*nonagrioides*, Lef.), has been noticed from another source [*R. A. E.*, A, xii, 228].

GAUMONT (L.). **Contribution à l'étude des Aphididae de France. I.**—*Ann. Epiphyties*, ix, no. 5, pp. 309–346, 31 pls. Paris, 1923. [Received 5th May 1924.]

This systematic paper deals with the classification of Aphids. Keys are given to the subfamilies, groups and genera of the families CHERMESIDAE and APHIDIDAE, and include a new genus, *Pteriaphis*, of the APHIDINAE.

RIGOTARD (L.). **Les Parasites du Noyer.**—*Jl. Agric. prat.*, xli, no. 19, pp. 375–376. Paris, 10th May 1924.

Cydia (*Carpocapsa*) *pomonella* is one of the most serious pests of walnut trees in the Department of Isère. The usual remedial measures against it are discussed, and the need for its further study on walnuts is pointed out.

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POUTIERS (R.). **Les Parasites du** *Chrysomphalus dictyospermi*, **Morg. en France.**—*C.R. Acad. Agric. France*, x, no. 16, pp. 490–496. Paris, 7th May 1294.

Chrysomphalus dictyospermi is spreading rapidly in the Mediterranean basin, and the only natural enemies observed hitherto have been the Coccinellids, *Chilocorus bipustulatus*, L., and *Exochomus quadripustulatus*, L., which, however, produce little effect. In 1923, a study was made of the parasites occurring in the Mentone district, which included *Aphelinus chrysomphalus*, Mercet, 56·9 per cent.; *A. maculicornis*, Masi, 23·7; *A. bovelli*, Malen., 15; *Aphycus flavus*, How., 2·5; and *Prospaltella fasciata*, Malen., 1·9. The ectophagous parasites (*Aphelinus* and *Aphycus*) are obviously much more numerous than the endophagus (*Prospaltella*), and of these *A. chrysomphalus*, which lives exclusively on *C. dictyospermi*, is by far the most important. *A. bovelli* has hitherto been considered an exotic species. The mode of parasitism by *Aphelinus* is described. All three species produce several generations during the summer season. Both larvae and nymphs of female *C. dictyospermi* are parasitised in much larger numbers than males during the summer, but towards the end of the season, probably because practically all the remaining individuals are males, these are parasitised in their turn, and it is in them that hibernation of *Aphelinus* takes place.

DU BUYSSON (H.). **Ravages causés aux choux et choux-fleurs par** *Baris laticollis* **Marsh. et** *Baris chlorizans* **Germ.**—*Rev. sci. Bourbonn. & Centre Fr.*, 1924, no. 1, pp. 3–11. Moulins, April 1924.

An account is given of *Baris laticollis*, Marsh., and *B. chlorizans*, Germ., attacking cabbages and cauliflowers in the Bourbon district [*R.A.E.*, A, xi, 114, 399], and attention is drawn to the importance of uprooting old plants instead of leaving them in the ground so that the insects can emerge. Immediately after being uprooted, the plants should be thrown into water, as this is a better method of destruction than by fire. Previous records of the occurrence of these beetles are quoted, and brief notes are given on the various species of *Baris* found in the Bourbon region.

[SHESTAKOV (A.).] **Шестаков (А.). Матерьялы к познанию фауны вредных насекомых Ярославской губернии.** [Contribution to the Knowledge of the Noxious Insect Fauna of the Yaroslav Government.]—Yaroslav, 1923, 48 pp.

This list includes 221 species of noxious insects arranged according to their natural orders. It is compiled from the records of other workers and the author's personal observations from 1905 to 1918. A bibliography of 119 works concerning the insect fauna of the Yaroslav Government is appended.

[PLOTNIKOV (V. I.).] **Плотников (В. И.). Результаты наблюдений над изменчивостью** *Locusta migratoria* **L. и** *L. danica* **L. летом 1923 г.** [The Results of Observations on the Variability of *L. migratoria*, L. and *L. migratoria*, ph. *danica*, L., during the Summer of 1923.]—**Бюллетень 1-го Средне-Азиатского Государственного Университета** [*Bull. 1st Central Asiatic State Univ.*], no. 1, pp. 15–16. Tashkent, November 1923. [Received 22nd May 1924.]

This is a brief account of breeding experiments recorded more fully in another paper [*R.A.E.*, A, xii, 226].

[Nevski (V.).] **Невский (В.). Справочник по борьбе с вредителями огородничества Сыр-Дарьинской Области.** [Notes on the Control of Vegetable Pests of the Syr-Daria Region.]—**Сыр-Дарьинское Энтом. Бюро** [*Syr-Daria Ent. Bur.*], 28 pp., 18 figs. Tashkent, 1924.

This pamphlet is intended as a guide for the control of the more common pests of vegetable crops, the information being grouped under the plants attacked. Instructions are also given for the preparation of the various remedies recommended.

[Znamenski (A. V.).] **Знаменский (А. В.). О массовом появлении вредителей зерновых хлебов.** [The Abundance of Grain Pests.]—**Полтавск. С.Х. Опытная Станция, Энтом. Отдел** [*Poltava Agric. Expt. Sta., Ent. Dept.*], Bull. 1, 8 pp. Kharkov, 1923.

Owing to meteorological conditions the spring sowing of grain crops in 1923 was somewhat delayed, so that ideal conditions prevailed for the development of such pests as *Phorbia* (*Chortophila*) *genitalis*, Schnabl, *Oscinella* (*Oscinosoma*) *frit*, L., *Mayetiola destructor*, Say, and flea-beetles. *Meromyza saltatrix*, L., usually found on wild plants such as *Poa*, *Festuca* and *Dactylis*, is also recorded as injuring grain crops. These conditions occurred in the Poltava and Kharkov regions extending down to the Black Sea.

[Znamenski (A. V.).] **Знаменский (А. В.). Распространение гессенской и шведской мух и некоторых других вредителей полеводства в 1923 г. на Украине.** [The Distribution of the Hessian and Frit Flies and some other Field Pests of 1923 in the Ukraine.]—**Полтавск. С.Х. Опытная Станция, Энтом. Отдел** [*Poltava Agric. Expt, Sta., Ent. Dept.*], Bull. 2, 25 pp. Kharkov, 1923.

This is a more detailed account of the conditions referred to in the previous bulletin, the additional insects enumerated being the flea-beetles, *Chaetocnema aridula*, Gyll., and *C. hortensis*, Geoffr., *Chlorops taeniopus*, Mg., and *Cephus pygmaeus*, L.

The parasites of *Mayetiola* (*Phytophaga*) *destructor*, Say, were collected in the following order of abundance, *Merisus destructor*, *Entedon epigonus*, Wlk., *Eupteromalus arvensis*, Kurd., *Meraporus crassicornis*, Kurd., *Eupelmus* spp., *Trichalcis remulus*, Wlk., and several undetermined species. The hyperparasite, *Micromelus rufomaculatus*, Wlk., was also found in large numbers. *Polygnotus minutus*, Lind., seems to have completely disappeared during the last few years, though previously it was the most efficient parasite of the Hessian fly.

A study of the local distribution of these pests has been undertaken with the view to ascertaining the possibility of formulating and applying the bioclimatic law in Russia, as well as determining the factors governing the fluctuating balance between insects pests and parasites.

It is hoped by this means in future to be able to forecast insect attack, and successfully to control the damage caused by *Mayetiola destructor* and *Oscinella frit* by regulating the time of sowing.

STELLWAAG (F.). **Versuche zur Bekämpfung der Traubenwickler im Jahre 1923.** [Experiments in Combating the Vine-moths in 1923.]—Reprint, 5 pp., from *Deutscher Weinbau,* 1924. [*Sine loco.*]

In 1923 the flight of *Polychrosis botrana,* Schiff., was rapidly checked by the advent of cold weather about mid-May, and only such females oviposited as had mated before the 9th May. The emergence of *Clysia ambiguella,* Hb., occurred just prior to the bad weather, but this species did not suffer to the same degree, the chief effect being that mating and oviposition lasted for as much as 5 weeks. Bad weather from the end of July to September also interfered with the second generation of the moths, so that no definite flight period was observable.

STELLWAAG (F.). **Uraniagrün im Weinbau.** [Urania Green in Viticulture.]—Reprint, 19 pp., from *Pfalzwein,* 1924. [*Sine loco.*]

Urania green, an improved form of Paris green, has come into general use in the vine-growing districts against both generations of the vine-moths, *Clysia ambiguella,* Hb., and *Polychrosis botrana,* Schiff. In combination with the lime and copper sulphate solution for fungous pests it is one of the most satisfactory remedies available and reduces the cost of vine-moth control to one thirty-fifth that of combating fungous pests. Pure Urania green is lighter than Paris green, and therefore precipitates more slowly. Its adhesive power suffices in practice, provided that repeated applications are made.

STELLWAAG (F.). **Die Tierwelt tiefer Weinkeller.** [The Fauna of deep-lying Wine Cellars.]—*Wein. u. Rebe,* 1924, pp. 277–297. [*Sine loco.*]

Cellars for storing wine in barrels are deep underground, have a constant temperature of about 10°C. [50°F.], have an atmosphere containing carbon dioxide and saturated with moisture kept at the same degree by the fungi on the walls. They are fumigated with sulphur at least once a month and are swept out regularly. In spite of these unfavourable conditions they have a considerable fauna. In 23 hours the author collected 2,388 specimens of insects and spiders, which are enumerated and briefly discussed. They include a Braconid, *Meteorus ruficeps,* Marsh., hitherto noticed as a parasite of butterflies only, but which also attacks, though to an unimportant extent, the cork moth, *Tinea cloacella,* Hw.

In bottle stores *T. cloacella* and the small Coleoptera, *Rhizophagus bipustulatus,* F., *Mycetaea hirta,* Marsh., and *Cryptophagus pilosus,* Gyll., found in its mines are active destroyers of corks. Other cork pests that have been previously recorded are also enumerated.

The best measure against pests of cork is fumigation with hydrocyanic acid gas.

BLUNCK (H.). **Versuche zur Bekämpfung des Rapsglanzkäfers mit Fangmaschinen.** [Experiments in controlling *Meligethes aeneus* by means of Catching Apparatus.]—*Zeitschr. angew. Ent.,* x, no. 1, pp. 56–66, 4 figs. Berlin, April 1924.

Insecticides being unsatisfactory against the rape beetle, *Meligethes aeneus,* F., different types of apparatus for catching the beetles have been tested.

Hand nets are effective if skilfully manipulated. Sperling's apparatus consists of a number of pans smeared with petroleum jelly and suspended on a bar at distances that may be varied to suit that between the rows of plants. Each end of the bar is borne by one man, and it is carried through the field with the pans hanging between the rows. A lath, parallel to the cross bar, but in front and lower down, sweeps the plants. This apparatus may be used even if the plants are quite young and only 10 inches high. Its great disadvantage is that many beetles fall between the pans on to the ground. A horse-drawn machine is also described in detail. The disadvantage of this type is that the animal pulling it disturbs the beetles on the two rows between which it walks.

If such mechanical catches are to be made, it is essential that the seed be drilled and not sown broadcast. The best time for catching is when the plants are quite young, and the chief injury also occurs at this period.

Menzel (R.). **Ueber Teeschädlinge in Niederländisch-Indien und ihre Bekämpfung. 1. Die Tachine** *Chaetexorista javana* **B. u. B. als wirksamer Parasit der Limacodidenraupe** *Setora* (*Miresa*) *nitens* **Wlk.** [Tea Pests in the Dutch East Indies and their Control. 1. The Tachinid, *C. javana*, as an efficient Parasite of the Limacodid Caterpillar, *S. nitens*.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 67–74, 3 figs. Berlin, April 1924.

Further information is given about the Tachinid parasite of the Limacodid, *Setora nitens*, Wlk., attacking tea in Java [*R. A. E.*, A, x, 175]. It has been identified as *Chaetexorista javana*, Br. & Berg. Hitherto the author has bred it from *S. nitens* only, but whether this moth is really its only host has not been definitely ascertained. It appears to be a very efficient parasite; in one instance a batch of 324 cocoons yielded 40 moths (12·3 per cent.) and 284 parasites (87·7 per cent.).

The female fly oviposits on the caterpillar, and in one case the newly hatched Tachinid larva was seen to enter its host. The pupal stage of the Tachinid lasts about 13 days, and the total time from egg to adult apparently requires 1–1½ months, a period corresponding with that of the host.

Other parasites of *S. nitens* are a Braconid, *Spinaria armator*, F., and two (probably new) species of the Chalcid genus, *Euplectrus*. The Chalcids appear to attack only the young stages. They pupate within the emptied hosts.

Kleine (R.). **Versuch über den Einfluss der Saatzeit, Korngrösse, Standorte und Saatpflege auf den Befall von** *Oscinis frit* **an 4 Hafersorten.** [An Experiment on the Influence of the Date of Sowing, Size of Grain, Situation of the Plants and Care of the Seed on the Infestation of 4 Varieties of Oats by *Oscinella frit*.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 75–98, 7 figs. Berlin, April 1924.

The results of numerous experiments, made near the coast of Pomerania, about 3 miles from Stettin, are described in great detail. The weather was favourable both to vegetation and to insect life, the very

hot summer being compensated by a sufficient rainfall. The care of the seed referred to in the title consisted in the removal by hand of all weeds in order accurately to test experiments in hoeing. Infestation by the first generation of *Oscinella* (*Oscinis*) *frit* did not appear to be influenced by the dates on which the hoeing was done, nor by varying distances between the plants. The variety of oats did cause a difference. As regards infestation by the second generation, Rörig has stated that if the weather has been good the ears are little injured, whereas in the case of slow growth after a cold spring the ears suffer more than the haulms. In these experiments this opinion seemed to be confirmed, for injury to the haulms was always present, while the ears suffered so slightly that the infestation by the second generation of *O. frit* was unimportant as regards injury to the grain. It may be said in general that early sowing is the chief measure against infestation, as the warmth-requirements of the plants are less than those of the fly. If sowing has to be delayed, varieties that grow quickly should be sown. The distances at which the seed should be sown to obtain the best yield agree with those provided in practice by the drilling machine.

Komárek (J.) & Breindl (V.). **Die Wipfelkrankheit der Nonne und der Erreger derselben.** [The Polyhedral Disease of the Nun Moth and its Causal Agent.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 99–162, 2 pls., 1 fig. Berlin, April 1924.

After a brief historical review of existing knowledge relating to the polyhedral disease of the larvae of the nun moth, *Liparis monacha*, the authors give a detailed account of their own researches, undertaken as a result of the disastrous infestation of Bohemian spruce forests by this pest [*cf. R. A. E.*, A, x, 28]. In all outbreaks observed during the past decades in Central Europe the infestation began in pure spruce stands and then spread to mixed stands and forests of deciduous trees. Each outbreak was checked in 3–4 years by the polyhedral disease, and the authors' object was to ascertain whether the latter could not be utilised against the pest. The causal agent of the disease morphologically resembles the micro-organisms called Chlamydozoa by Prowazek. The polyhedral bodies are a final stage in the cycle of these micro-organisms, and also a lasting form of it. When infected caterpillars die and decompose, the polyhedral bodies become freed and are deposited on leaves, etc., until they accidentally enter the intestine of a feeding caterpillar. As the intestinal cells are not affected and therefore do not form polyhedral bodies, the latter cannot be evacuated with excreta. Infection does not occur only by means of these bodies; the free micro-organisms themselves appear able to survive for considerable periods and may infect caterpillars on the ground or on the foliage. Though no definite information was obtained regarding the hereditary transmission of the disease, such transmission seems not to occur. The authors found that the presence of polyhedral disease can be ascertained by examining fallen leaves, etc., from forest areas; it is unnecessary to wait until caterpillars, pupae and moths appear. As the polyhedral bodies are infective, there is no need to use the bodies of infected caterpillars to spread the disease. It may be assumed that the successful spread of the disease in the second year of its occurrence is due to the polyhedral bodies from the previous year that are lying on the ground. If this is so, areas that are still free from the nun moth can be protected by spreading over them dead leaves and other ground

debris from infested areas in order to ensure the occurrence of the disease. Owing to the natural prevalence of the disease the authors were unable to test this method.

STELLWAAG (F.). **Die Benetzungsfähigkeit flüssiger Pflanzenschutzmittel und ihre direkte Messbarkeit nach einem neuen Verfahren.** [The Wetting Power of Liquid Media for protecting Plants and the possibility of measuring it directly by a new Method.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 163–176, 3 figs. Berlin, April 1924.

Most of the information given here has been already noticed [*R. A. E.*, A, xii, 54, 286]. In current practice the wetting power of sprays is increased by the addition of substances that have a small surface tension even if considerably diluted, and soaps are universally used for the purpose. The measurements made by the author show that soap is actually preferable to other substances in the usual dilutions of spray solutions, but that various makes differ largely in this wetting power.

STELLWAAG (F.). **Blutlaus und Nährpflanze.** [Woolly Aphis and its Food-plant.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 177–180. Berlin, April 1924.

An investigation of the varieties of apple grown in the Rhine Palatinate has enabled the author to draw up a list in which the varieties are grouped in order, ranging from full susceptibility to entire freedom from infestation by the woolly apple aphis, *Eriosoma lanigerum*, Hausm. It is pointed out that the findings differ from those in other regions. Most of the varieties are not attacked even in conditions favourable to the pest, and the author considers that varieties showing slight susceptibility might be entirely free if grown in situations less favourable to the Aphid, *i.e.* cooler or windier places. No highly susceptible varieties should be grown in the nurseries in future.

American elms (*Ulmus americana*) planted in 1917 near infested apple trees in order to permit observations of migration by the woolly aphis have entirely failed to become infested. As both in the Palatinate and other parts of Germany American elms seldom occur near apple trees, but the latter are, in many cases, infested, it seems that hibernation is largely due to parthenogenetically produced winter forms, so that migration to *U. americana* is of theoretical importance only.

STELLWAAG (F.). *Tinea cloacella* **Hw. und** *Tinea granella* **L.**—*Zeitschr. angew. Ent.*, x, no. 1, pp. 181–188, 4 figs. Berlin, April 1924.

Some doubt has existed as to whether the cork moth, *Tinea cloacella*, Hw., is not a variety of *T. granella*. L., but the author finds that there are distinct morphological differences between them. There are biological differences also. *T. granella* prefers dry food such as dry grain, mushrooms, etc. The same material may be used by *T. cloacella* if sufficiently damped; the larvae die if the food is too dry. *T. cloacella* was not found in dry cellars where other conditions were suitable. This physical peculiarity in its food explains why *T. cloacella* attacks corks in damp bottle-stores and casks that are filled. The information regarding the damage done by it and its control has been noticed from another source [*R. A. E.*, A, xii, 292].

SPEYER (W.). **Spritzen und Stäuben mit Arsengiften zur Bekämpfung der Obstmade** (*Carpocapsa* [*Cydia*] *pomonella* **L.**). [The Control of the Fruit Maggot, *Cydia pomonella*, by Arsenical Sprays and Dusts.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 189–210. Berlin, April 1924.

After reviewing methods for combating *Cydia pomonella*, L., an account is given of experiments with arsenicals at Naumburg in 1922. Whereas collection of fallen fruit destroys about 20 per cent. of the pest and trap-banding accounts for about 25 per cent., arsenicals will destroy some 50 per cent., and have a direct result on the harvest which the other methods do not. The use of these poisons is therefore recommended.

REH (L.). **Phytopathologisches von Holland.** [Phytopathological Notes from Holland.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 211–216. Berlin, April 1924.

This is a brief account of the Dutch Plant Protection Service. Carbolineum is the chief fruit-tree insecticide used. As the export of plants and plant products is the chief object in Dutch agriculture, the examination of exports is an extensive branch of the work.

DINGLER (M.). **Ueber das Auftreten von Tipuliden in Nonnengebieten.** [On the Occurrence of Tipulids in Nun Moth Areas.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 217–218. Berlin, April 1924.

In 1923 large numbers of Tipulid larvae were found in the leaf-litter of forests that had been severely infested by the nun moth, *Liparis monacha*, L., in the preceding years. The species concerned was *Tipula nubeculosa*, Mg., only 4 of the specimens examined being *T. lateralis*, Mg. On 25th May a parasitic Tachinid, *Admontia blanda*, Fall., emerged from one of the Tipulids. It is possible that the excreta of the nun moth produced conditions of warmth and humidity favourable for breeding, though at first sight no economic importance attaches to this relation between these insects.

DINGLER (M.). *Hedobia pubescens* **F., ein Insekt der Loranthaceen.** [*H. pubescens*, an Insect of Loranthaceae.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 218–220, 2 figs. Berlin, April 1924.

The Anobiid beetle, *Hedobia pubescens*, F., is recorded as infesting *Loranthus europaeus*. This species appears to be exclusively associated with mistletoe.

FRICKHINGER (H. W.). **Ein Beitrag zur Bekämpfung der Blutlaus.** [A Contribution to the Control of the Woolly Aphis.]—*Zeitschr. angew. Ent.*, x, no. 1, pp. 228–229. Berlin, April 1924.

Ustin, a preparation of F. Bayer & Co., has given excellent results against *Eriosoma lanigerum*. One application of a solution of one part with two of water painted on a densely infested tree not only killed all the insects but kept the tree free from them throughout the summer, although there was another heavily infested tree some 30 ft. away.

Dingler (M.). **Ein neues wirksames Mottenmittel.** [A new effective Insecticide against the Clothes Moth.]—*Zeitschr. angew. Ent.*, x, no. 1, p. 231. Berlin, April 1924.

Hexachlorethane (C_2Cl_6) is stated to be a satisfactory insecticide for use against the clothes moth on a small scale. It is a white, crystalline, aromatic powder that evaporates slowly. From 2 to 3 lb. is required for 1 cu. yd. of storage space. The larvae cease feeding in 2 days and die in 10–12 days. The eggs are killed in 4 days, and the adults in 24 hours. No harm is done to fabrics either in the dark or in sunshine.

Seitner (M.). **Kurze Anleitung zur Bekämpfung des 8-zähnigen Fichtenborkenkäfers** *Ips typographus* **L.** [Brief Instructions for combating *I. typographus*.]—*Vienna*, Steinbock 1922. (Abstract in *Zeitschr. angew. Ent.*, x, no. 1, p. 241. Berlin, April 1924.)

The biology of *Ips typographus* is described in formulae by means of Nüsslin's signs [*R. A. E.*, A, x, 329], and from these information is obtained as to remedial measures.

The following list of natural enemies of *I. typographus* is given. Parasitic enemies. Chalcids: *Ipocoelius seitneri*, Ruschka, *Eutelus typographi*, Ruschka, *Rhopalicus suspensus*, Ratz., *Rhoptrocerus xylophagorum*, Ratz. Braconids: *Coeliodes bostrychorum*, Giraud, *Eustalocerus clavicornis*, Wesm. Predacious enemies. Coleoptera: *Clerus formicarius*, L. Diptera: *Medetera signaticornis*, Lw., *Palloptera usta*, Mg., *Lonchaea fugax*, Beck.

Seitner (M.). **Beobachtungen und Erfahrungen aus dem Auftreten des 8-zähnigen Fichtenborkenkäfers** *Ips typographus* **L. in Oberösterreich und Steiermark in den Jahren 1921 und 1922.** [Observations and Experiences from the Occurrence of *I. typographus* in Upper Austria and Styria in 1921 and 1922.]—*Zentralbl. ges. Forstw.*, xlix, no. 1–3, 1923. (Abstract in *Zeitschr. angew. Ent.*, x, no. 1, pp. 241–242. Berlin, April 1924.)

The physical and forest conditions of a severe outbreak of *Ips typographus*, L., in the Austrian Alpine districts are dealt with.

Rensch (B.). *Aphelenchus neglectus* **sp. n., eine neue parasitäre Nematodenart.** [*A. neglectus* sp. n., a new parasitic Species of Nematode.]—*Zool. Anz.*, lix, no. 9–10, pp. 277–280, 1 fig. Leipzig, 20th May 1924.

A new Nematode, *Aphelenchus neglectus*, is reported from Germany, attacking various plants, including wheat, barley, rye, oats, sugar-beet, rape and poppy, large numbers being found in the roots of these plants. Adults, larvae and eggs are present simultaneously and at all seasons, but no males have been found in the roots. They apparently live freely in the soil, where pairing takes place. It is extremely probable that *A. neglectus* is widely distributed, but that hitherto it has been confused with *Heterodera radicicola*. No useful control can be suggested.

Simmonds (H. W.). **Report on Mission to New Guinea, Bismarcks, Solomons and New Hebrides.**—*Legislative Council, Fiji, Council Paper.* Suva, February 1924.

The history of *Levuana iridescens*, Beth. Bak., in Fiji is traced, and in consequence of its alarming spread [*R. A. E.*, A, xi, 212] a search has been made in the groups of islands to the north-west of Fiji for its occurrence and for studying any factors that check its increase. The possibility is suggested that *L. iridescens* may in its original habitat be strictly confined to a single species of palm, and that only on account of its increase to phenomenal numbers in Fiji has it extended its range of food-plants to coconuts and other palms, and recently also to banana.

L. iridescens was not found anywhere in the islands in question, and the only possible natural enemy that seems to occur is *Oecophylla smaragdina*, Latr. (red or green tree ant), which is abundant, and is very important in keeping insect pests off the trees. It attacks almost any insect except certain Coccids. In New Britain, many planters place ropes of vines to enable the ant to pass from tree to tree, and collect nests and place them among the coconuts. Leaf-eating larvae were noticeably abundant wherever the ant did not occur, and it is suggested that its value against *L. iridescens* should be fully tested, preferably on one of the smaller islets, where, if it was unsatisfactory, there would be no difficulty in eradicating it. Other suggestions are that egg parasites of an allied Zygaenid, *Hestiochora*, would probably attack *L. iridescens*, and further investigations are being made in Queensland where that genus occurs. It is thought possible that *L. iridescens* was originally introduced from South China, in which case the parasites of *Brachartona catoxantha* occurring in Malaya might be tried; the author considers that both the Ichneumonid and Chalcid parasites offer possibilities, but the Tachinid, which is the commonest, is very short lived. Sub-cultures of a beneficial fungus have been made, and an attempt is being made to inoculate *L. iridescens* with them. A suggestion was made in 1919 to cut out all coconut and royal palms on Vitilevu and thus starve the pest out, but as it was found also to feed on fan palms, the project was abandoned.

Infestations occur in waves and die out, but the moth seldom if ever disappears until it has utterly destroyed the foliage of all the trees in the district. Normally the moth attacks 2 or 3 trees and does not move to the adjoining ones until the first are badly destroyed. No more eggs are then laid on the first ones, but adjoining trees are attacked. Two species of bug, a jumping spider, and possibly a bird have been known to attack *L. iridescens*, and the hornet, *Polistes hebraeus*, F., devours the larvae.

The distribution of the various pests attacking coconuts in the territory visited is discussed. These included the Hesperid butterfly, *Corone palmarum*, Moore, which occurs throughout New Guinea, the Bismarcks and Solomons. The larva feeds under cover of two parts of the leaf drawn together with a wax-like secretion until only the midrib is left in many cases. Pupation occurs in a folded leaf. This species is heavily parasitised by a Tachinid, and numbers of a Braconid and of *Chalcis solomonis*, Cam., were also bred from it. On the one estate where it was present in great abundance, the ant, *O. smaragdina* seemed to be entirely absent, and under those conditions the parasites failed to keep it in check. The Cosmopterygid moth, *Batrachedra arenosella*, Wlk., which is present throughout the Solomons and New Hebrides, penetrates the unopened flower spathes in the larval stage,

and feeds on the flower buds within, a gummy exudation marking the point of entrance. Pupation occurs in an eaten-out flower bud or along the hollows in the main flower stem. Large numbers of male flowers and some female ones are destroyed, and fungous diseases are encouraged. It is a well-known pest in Malaya, whence it was probably introduced. The larvae of *Tirathaba rufivena*, Wlk., are also abundant in flower spathes, especially previously damaged ones. It was found in the Bismarcks, and also (or an allied form) in the Solomons. In Fiji, *T. trichogramma*, Meyr., destroys young nuts also, and *T. rufivena* may be found to have the same habit. In Fiji and Samoa the larva of *Agonoxena argaula*, Meyr., lives under a web, eating the lower surface of the leaves in straight lines, and pupates either on the leaf or drops to the ground and goes to some lower leaf, pupating over the midrib, where the adult frequently lies with a peculiarly flattened appearance. An allied species was found on coconuts and sago in the Solomons and New Britain, but in the New Hebrides occurred only on sago and did not attack coconuts. A parasite of it was obtained in New Britain.

Coleopterous pests, which occurred from New Guinea to the Solomons, included *Eurytrachelus pilosipes*, Waterh. (stag beetle), *Xylotrupes nimrod*, Voet. (elephant beetle), *Oryctes preussi*, Kolbe (rhinoceros beetle) and *Trichogomphus semilinki*, Ritz. (Solomon Islands rhinoceros beetle), all of which make wounds that give entrance to *Rhynchophorus ferrugineus*, Oliv. (red palm weevil) and *Rhabdocnemis* (*Sphenophorus*) *obscura*, Boisd. (sugar-cane weevil). *X. nimrod* and *E. pilosipes* eat the bark of mangroves and also of *Cassia candolliana*, which might be used as a trap for them. *Rhynchophorus ferrugineus* is one of the most serious pests in New Guinea and the Bismarcks, but although present in the Solomons, seems to do little damage there, and is unknown in the New Hebrides. *Rhabdocnemis obscura* was sometimes found in company with it, being probably attracted by fermentation from damaged trees. Another weevil, *Sparganobasis subcruciatus*, Mshl., attacks the base of coconut trees, which break off at the point of attack and fall to the ground, the borings greatly resembling those of *Cosmopolites sordidus*, Germ. (banana borer). The attacks were in patches among old trees, and all seemed to occur from 6 to 12 in. above the surface of the ground. As the beetles apparently crawl from tree to tree at night, traps consisting of fresh pieces of coconut wood were laid at the bases of the trees in the affected area and proved very successful. Tarring all the trees in an infested area for about 18 in. up and banking the soil against the bottom of the tar would be a preventive. There is probably an alternative food-plant. *Diocalandra* (*Calandra*) *taitensis*, Guér., or a nearly allied species, was occasionally seen throughout the area visited, but did little damage. The larvae of *Brontispa froggatti*, Sharp, live between the leaflets in the unopened frond of the coconut and constitute a very serious pest throughout the area, often killing young trees ; boys have to be employed opening out the young fronds, destroying both larvae and adults within them, and pouring a solution of arsenic into the crowns of affected trees. Earwigs may be some check on the beetle, but no other natural enemies were observed. *Promecotheca antiqua*, Weise, is a very serious pest in some parts of the Bismarck group, the young larvae mining in the leaves and producing brown patches. Though it has been called the Solomon Island leaf Hispid, it does not, apparently, occur in the Solomons. Parasites of both egg and larva were found, and a Pentatomid of the genus *Amyotea* feeds on the adults. *P. opacicollis*, Gestr., is also a

serious pest in parts of the New Hebrides, but a Chalcid, *Oligosita utilis*, Gir., destroys many eggs, and another one, *Closterocerus splendens*, Gir., attacks the larvae. If the species of *Amyotea*, which is found in New Britain, could be disseminated without its parasites, it would be highly beneficial, while in the damper portions of the infested territory a fungus from the same district should be of value. Other species of *Promecotheca* also damage coconuts in Fiji, New Guinea and the Philippines. *Ischiopsopha esmeralda*, Wlk. (green flower beetle) in the Solomons and allied species there and in the New Hebrides feed on the pollen, but probably do little damage. *Papuana laevipennis*, Arr., attacks seedling nuts from below in New Georgia (Solomons), the adults tearing away and tunnelling through the fibre until they reach the young shoot, which they frequently enter, tunnelling up the centre and killing the plant. It is said to attack taro [*Colocasia antiquorum*] also.

A large long-horned locust, which proved to be a new species of the Tettigoniid genus *Habetia*, defoliated many coconut palms in New Britain. The eggs are apparently laid in the ground, and hoeing under the trees generally destroyed the pest.

Rhynchota included *Axiagastus campbelli*, Dist., exceedingly numerous on freshly-opened flowers, and probably assisting in the spread of various fungous diseases; a small hopper, *Euryphlepsis cocos*, Muir (MS.), in Guadalcanal (Solomons), which turns the trees brown, but is destroyed by a fungous disease; and *Aspidiotus destructor*, Sign., which is kept in check by parasites, in New Guinea, the Bismarcks and Solomons. *Aulacaspis cinnamoni* v. *mangiferae*, Newst., in the New Hebrides, was doing immense damage in some localities; a Chalcid parasite was recorded, but no Coccinellids were observed, and their introduction would probably prove beneficial. *Aspidiotus cyanophylli*, Sign., *Pinnaspis minor*, Mask., *Eucalymnatus* (*Lecanium*) *tessellatus*, Sign., *Pseudococcus simmondsi*, Laing, and *Cerataphis lataniae*, Boisd., were minor pests in the Bismarcks; and *Aspidiotus aurantii*, Mask., *Oregma nipae*, v. d. G., and *Platylecanium cocotis*, Laing, in the New Hebrides.

Miscellaneous pests of some importance in the New Hebrides were *Platyedra* (*Gelechia*) *gossypiella*, Saund. (pink bollworm) and the stainer, *Dysdercus sidae*, on cotton, which is generally ratooned for several seasons, so that there is no check on the increase of the pests; larvae of the Lycaenid, *Telicada excellens*, Butl., damaging Cycads; and *Cosmopolites sordidus* (banana borer), which is abundant.

MILLSPAUGH (—.). **A Bug destructive to Wheat in Persia.**—MS. received from Foreign Office, 14th June 1924.

An area of approximately 3,250,000 acres in the vicinity of the Gharaghadj mountains has been burned over in an initial effort to destroy a bug known as "seyn" [possibly *Nezara viridula*], which yearly causes immense damage to crops in the Veramine and other districts of Tehran. Between 500 and 600 labourers and troops were employed in this work; the latter through the co-operation of the Minister of War. It resulted in the destruction of an immense number of the insects, those found in a single bush, after burning, varying from 26 to 100. As spring advanced and burning became too costly, the collection and purchase of living individuals in the wheat fields was organised. These steps, while important and valuable as regards the

results obtained, must be considered as only preliminary ones, and the work must be continued for at least three years if the pest is to be exterminated in this region.

The destruction caused by the bug is expected to be very considerable in the ensuing year, and it is thought that if this work had not been undertaken, there would have been an infinitely greater loss.

WEISE (J.). *Colaspoides javana* **n. sp. (Col. Chrysom.).**—*Treubia*, v, no. 1–3, p. 235. Buitenzorg, February 1924.

A new Chrysomelid, *Colaspoides javana*, is described from cinchona in Java.

ROHWER (S. A.). **Descriptions of Three Species of *Tiphia* parasitic on *Popillia japonica* (Hym.).**—*Proc. Ent. Soc. Wash.*, xxvi, no. 4, pp. 87–92. Washington, D.C., April 1924.

New species of *Tiphia* parasitic on *Popillia japonica* in Japan are *T. autumnalis*, which oviposits dorsally on the thorax of larvae of *Anomala* and successfully attacks the larvae of *P. japonica*; *T. popilliavora*, recorded as parasitic on larvae of *Lachnosterna* (*Phyllophaga*) spp. as well as those of *P. japonica*; and *T. vernalis*, attacking the larvae of *P. japonica* ventrally. A more detailed account of these parasites is to be published shortly.

REGAN (W. S.) **The Fruit-tree Leaf-roller in the Bitter Root Valley.**—*Montana Agric. Expt. Sta.*, Bull. 154, 56 pp., 8 figs., Bozeman, Mta., February 1923; also Circ. 109, 13 pp., 8 figs., December 1922. [Received 12th May 1924.]

An account is given of the life-history and habits of *Tortrix* (*Cacoecia*) *argyrospila*, Wlk., which has been a serious pest for several years in the Bitter Root Valley, Montana [*R. A. E.*, A, ix, 585]. The uses of miscible oil as a remedy are discussed [*R. A. E.*, A, x, 134; xi, 448]; it should be applied at 8 per cent. strength, increased to 10 per cent. in severe cases, with a spray gun at a pressure of 275 lb. or more. For mild infestations, lead arsenate is advised, using 4 lb. to 100 U.S. gals. of water, with the addition of ½ to 1 lb. calcium caseinate as a spreader [*R. A. E.*, A, xi, 13].

Parasitism during 1922 rose as high as 30 per cent., the following being reared from leaf-roller pupae: the Tachinid, *Zenillia* (*Exorista*) *vulgaris*, Fall., and the Ichneumonids, *Itoplectis conquisitor*, Say, and *Herpestomus* sp., which are the most numerous; the Braconid, *Macrocentrus* (*Amicroplus*) sp., of which only a few were reared, and the Chalcidids, *Pteromalus* sp. and *Microdontomerus fumipennis*, which are of very minor value.

PARKER (J. R.). **Improvements in the Methods of Preparing and Using Grasshopper Baits.**—*Montana Agric. Expt. Sta.*, Bull. 148, 19 pp., 1 fig. Bozeman, Mta., February 1922. [Received 12th May 1924.]

Since amyl acetate was found to be a good substitute for more expensive ingredients in grasshopper baits [*R. A. E.*, A, ix, 249], it has been used with much success. Experimental tests in 1920 and 1921 are tabulated, and the physical properties of amyl acetate and its

advantages over lemons are discussed. The quickest and greatest effect was produced when the poison bait was applied in the late morning on warm, bright days when the grasshoppers were moving actively about, but it must be borne in mind that this is not necessarily true for conditions in other States.

Cooley (R. A.). **Grasshoppers, Cutworms and other Insect Pests of 1921–1922, being the 19th Report of the State Entomologist of Montana.**—*Montana Agric. Expt. Sta.*, Bull. 150, 31 pp., 5 figs. Bozeman, Mta., December 1922.

Cooley (R. A.). **Reports of the Department of Entomology.**—*28th & 29th Ann. Repts.* (*1920–21 & 1921–22*), *Montana Agric. Expt. Sta.*, pp. 49–55, 2 figs., & pp. 21–22. Bozeman, Mta., February 1922 & 1923. [Received 12th May 1924.]

The infestation of grasshoppers in Montana in 1921 was very serious, the most injurious species being the same as in the previous year [*R. A. E.*, A, ix, 585], and maps are given showing their distribution. There was a particularly sudden increase of *Melanoplus bivittatus*, Say, in the Yellowstone valley, which, together with the occurrence of *M. atlantis*, Riley, necessitated organised campaigns. In all, more than 700,000 acres of infested land in Montana were treated, the saving of crop being estimated at over £500,000, at a cost of approximately £37,000 for materials.

The loss to wheat and other crops from *Porosagrotis orthogonia*, Morr. (pale western cutworm) has much diminished, probably owing in large measure to heavy snowstorms destroying many adults, better moisture conditions, and greater prevalence of natural enemies. Further investigations have not revealed any direct method of destroying the cutworms. Summer fallowed ground, not worked at all between 15th July and 15th September, and ploughed early, is generally the least affected. In some years early spring ploughing will prove as effective as summer fallow. No cultivation practices are of value where winter wheat is grown, except when the wheat is sown after 15th September. Infested fields that can be irrigated should receive the water as early as possible.

Other pests included the blister mite [*Eriophyes pyri*, Pgst.], which caused heavy losses in apple orchards in 1921, but was much less injurious in 1922, owing to the use of lime-sulphur or miscible oil; *Calandra granaria*, L., and *Laemophloeus pusillus*, Schön., in granaries; the thrips, *Frankliniella tritici*, Fitch, which damages lucerne seed and interferes with the production of honey; grasshoppers, including *Anabrus simplex*, Hald. (Mormon cricket), which seems to have appeared in Montana for the first time; *Nysius ericae*, Schill., in ears of maize; *Eriosoma* (*Schizoneura*) *americanum*, Riley (elm gall louse), occurring wherever elm is an important shade tree; *Brevicoryne brassicae*, L. (cabbage aphis), which was noticeably more abundant than in 1920; the cutworms, *Euxoa ochrogaster*, Gn., *E. tristicula*, Morr., which occurred on Russian thistle (*Salsola pestifer*) early in the season, *E. pallipennis*, Sm., found in 1922 on *S. pestifer*, but not recorded from any other food-plant, *Agrotis unicolor*, Wlk. (*Noctua clandestina*, Harr.), feeding mostly on garden vegetables and some grasses, and *Agrotis havilae*, Grote, and *Euxoa* (*A.*) *c-nigrum*, L., on prairie land; other Lepidoptera, including *Schizura concinna*, A. & S. (red-humped apple caterpillar), the larvae of which damaged

apple foliage; *Loxostege sticticalis*, L. (sugar-beet webworm), less abundant than in recent years; *Pieris* (*Pontia*) *rapae* (imported cabbage worm), more injurious than usual; *Marumba modesta*, Harr. (poplar sphinx moth); and *Tortrix* (*Archips*) *rosaceana*, Harr. (oblique-banded leaf-roller), causing considerable injury; the Diptera, *Hylemyia cerealis*, Gill. (western wheat stem maggot), which caused a total loss of crop over thousands of acres; *Rhagoletis cingulata*, Loew, and *R. fausta*, O.S. (cherry maggots); *Meromyza americana*, Fitch (greater wheat stem maggot); *Straussia longipennis*, Wied. (sunflower maggot), which bores through the pith, leaves the plant a few inches below the head, falls to the ground and pupates during the winter; and *Epochra canadensis*, Loew (currant fruit-fly), which is the chief pest of currants in Montana; the Coleoptera, *Aphodius inquinatus*, Hbst. (dung beetle), the adults of which were said to feed on newly sown wheat, though the larvae apparently caused no damage; *Zeugophora scutellaris*, Suff. (cottonwood leaf-miner); the flea-beetles, *Epitrix subcrinita*, Lec., *Phyllotreta albionica*, Lec., *Psylloides punctulata*, Melsh., and *Disonycha triangularis*, Say, on garden vegetables; the blister beetles, *Epicauta maculata*, Say, and *Cantharis* (*Lytta*) *nuttalli*, Say, living on grasshopper eggs and injuring lucerne and vegetable crops; *Conotrachelus nenuphar*, Hrbst. (plum curculio), found occasionally on apple; and *Baris carbonaria*, Blatchley, a new pest on strawberries.

Pests recorded in 1922 and not noted above include *Melanoplus bruneri*, Scudd., recorded for the first time in Montana, *Acyrthosiphon* (*Illinoia*) *pisi*, Kalt. (pea aphis), attacking lucerne, but almost exterminated by Coccinellids; *Chorizagrotis auxiliaris*, Grote (army cutworm), in grain fields; *Cirphis unipuncta*, Haw. (army worm); *Malacosoma fragilis*, Stretch (western tent caterpillar), and *M. disstria*, Hb.; and *Haltica bimarginata*, Say (alder flea-beetle).

Beneficial insects included *Sarcophaga kellyi*, Aldr. (flesh fly), parasitic on grasshoppers, and *Calosoma calidum*, F. (fiery ground beetle), predacious on *Porosagrotis orthogonia*.

During 1921 the insect pest law was passed, empowering county commissioners to appoint an officer to supervise the control of any dangerous insect pest and to levy a general tax for necessary supplies.

Cooley (R. A.), Parker (J. R.) & Strand (A. L.). **Improved Methods of controlling Grasshoppers.**—*Montana Agric. Expt. Sta.*, Circ. 112, 20 pp., 1 fig. Bozeman, Mta., January 1923. [Received 12th May 1924.]

A brief account is given of the various grasshoppers that occur in Montana [*R. A. E.*, A, ix, 585] with notes on each. The weather conditions that favour their increase are discussed. During 1920–22 over 10,000 tons of poison bait was used in Montana; the preparation proving most successful under Montana conditions was composed of 100 lb. coarse bran (the coarseness is essential), with 4 lb. finely powdered crude arsenic or Paris green, 4 lb. cheap grade granular dairy salt, 2 U.S. gals. low grade molasses, 3 oz. amyl acetate ("Technical" quality) with 10 to 12 U.S. gals. water. When molasses and amyl acetate are not available and immediate action is necessary, the formula recommended is bran, arsenic and salt as above, with 12 to 14 U.S. gals water. If bran is not obtainable, sawdust might be substituted, cottonwood or pine sawdust that has lain in the pile for several years is better than strong-smelling fresh sawdust. Where

large amounts of poison are being used, the arsenic should be added to the liquid ingredients instead of being mixed with the bran while dry. Details are given for preparing 500 lb. lots of the bait.

Other measures, such as destruction of the eggs, hopper traps, burning of weedy fields or roadsides, irrigation, etc., are dealt with, and the organisation of an anti-locust campaign is described.

NEWCOMER (E. J.) & WHITCOMB (W. D.). **Suppressing Codling Moth in Eastern Washington.**—*Better Fruit*, xviii, no. 10, pp. 5–6 & 20–21. Portland, Oregon, April 1924.

The life-history of the codling moth [*Cydia pomonella*, L.] [*R. A. E.*, A, xi, 417] is described. Various spray schedules are given, with directions for the preparation and application of the sprays.

DRAKE (C. J.), FENTON (F. A.) & BUTCHER (F. D.). **Hessian Fly Control in Iowa.**—*Iowa Agric. Expt. Sta.*, Circ. 86, 11 pp., 4 figs. Ames, Iowa, July 1923. [Received 14th May 1924.]

This popular account of *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly) shows the importance of co-operation in reducing the injury caused by it. The only possible means of preventing widespread destruction is to sow the wheat on or after the fly-free date, and observation stations have been established in various districts of Iowa for the determination of this date. Crop rotation should be practised where possible, and all stubble must be ploughed under immediately after harvest, unless wheat is used as a nurse crop for clover or timothy.

CHAPMAN (R. N.). **Observations on the Life History of *Taphrocerus gracilis* (Say) (Beetle, Family Buprestidae).**—*Cornell Univ. Agric. Expt. Sta.*, Mem. 67, 13 pp., 4 pls. Ithaca, N.Y., May 1923. [Received 14th May 1924.]

Taphrocerus gracilis, Say, is only found on a bulrush (*Scirpus fluviatilis*), of which it mines the leaves. It is apparently unique among the Buprestids in that it emerges and feeds for a month or two before it hibernates in the adult stage. All stages are described, and the correlation of its structure and habits is discussed.

VORHIES (C. T.). **The Grape Leaf-hopper in Arizona.**—*Arizona Agric. Expt. Sta.*, Timely Hints for Farmers, no. 146, 14 pp., 9 figs. Tucson, Ariz., 15th March 1924.

Erythroneura comes, Say (grape leaf-hopper) is a pest wherever grapes are grown in Arizona, and as it occurs on wild grapes is probably indigenous. The slight differences between its life-history in Arizona and in California are discussed. There are certainly two generations and probably a partial third in Arizona, and the insect apparently remains active during the winter on practically any green vegetation in the vicinity of a vineyard, particularly on Bermuda grass [*Cynodon dactylon*], lucerne, dewberries, hollyhocks, etc. Such vegetation should therefore be eliminated as far as possible near vineyards.

Measures against the adults are not as a rule very successful, spraying being practically useless, as they are very active and also resistant. Dusting with two machines at once was fairly successful, one man and

machine driving the adults out of the vine to the opposite side. The dust used must contain 7½ to 10 per cent. of nicotine (preferably the latter) and must be applied on a warm, calm day. A hopper cage is also described; this jars the vine, causing the hoppers to fly outward, and is coated inside with crude oil, which catches them. Early in the season about 90 per cent. of the adults were killed by this means. The most effective measure, however, is to spray the nymphs with nicotine sulphate, 40 per cent., ½ pint to 100 gals. water (or double this strength), with soap at the rate of 4 lb. per 100 U.S. gals. Suitable machines for spraying and dusting are described and the cost is discussed, dusting proving the cheaper method and being effective when thoroughly done.

PHILLIPS (W. J.) & POOS (F. W.). **Five new Species belonging to the Genus** *Harmolita*, **Motschulsky** (*Isosoma* **Walker et auct.**).—*Kansas Univ. Sci. Bull.*, xiv, no. 13, pp. 349–359, 2 pls. Lawrence, Kans., October 1922. [Received 19th May 1924.]

The new Chalcids described are *Harmolita swezeyi* from Bermuda grass (*Cynodon dactylon*) from Hawaii, *H. panici* from *Panicum clandestinum* from Virginia, *H. phalaridis* from *Phalaris* sp. from New York, *H. cinnae* from *Cinna arundinacea* from Ohio and *H. phalaricola* from *Phalaris* sp. from South Dakota.

BEYER (A. H.). **A Brief Résumé of Investigations made in 1913 on** *Trogoderma inclusa*, **Lec. (a Dermestid).**—*Kansas Univ. Sci. Bull.*, xiv, no. 15, pp. 373–391, 2 pls. Lawrence, Kans., October 1922. [Received 19th May 1924.]

Trogoderma inclusa, Lec., is recorded as infesting horse collars, the source of the infestation being in the grain in the straw stuffing.

The adults paired a day or two after emergence. The eggs varied in number from 10 to 50. The larvae, which were reared on rye grain, hatched in 8–12 days at ordinary room temperature, and the majority matured in about 5 months. The average life of the adult is about 18 days. The larvae and adults show strong negative reactions to light. Experiments showed that heat is the best method for the destruction of this Dermestid. At 118° F. the adults and many of the larvae were dead, and at 119° F. there was no sign of life. This beetle, though uncommon, is generally distributed over the United States and Europe and is omnivorous in its feeding habits, though it thrives best on cereals.

WORTHLEY (H. N.). **The Biology of** *Trichopoda pennipes*, **Fab. (Diptera, Tachinidae), a Parasite of the Common Squash Bug.**—*Psyche*, xxxi, no. 2, pp. 57–77, 4 pls. Boston, Mass., April 1924.

The second part of this paper [*R. A.E.*, A, xii, 213] deals with the morphology of all stages of this Tachinid parasite of *Anasa tristis*.

HYSLOP (J. A.). **Statistical Methods in Entomology.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 177–180. Geneva, N.Y., April 1924.

The importance of statistical work in entomology is pointed out. Much survey work loses a great deal of its potential value because the estimates are based on observations that are sufficient in neither

number nor detail, and also because the lack of a standard set of units for such work prevents comparison with the estimates of other workers.

Burgess (A. F.). **Methods of Estimating Abundance and Damage caused by the Gipsy Moth.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 180-183. Geneva, N.Y., April, 1924.

The following is the author's abstract of this paper: The methods of securing information on the abundance of and damage caused by the gipsy moth, *Porthetria dispar*, L., are detailed for the purpose of indicating the means that can be used to secure information on a single-brooded tree-defoliating insect. Detailed information was secured from different areas and in different types of forest growth.

Hartzell (F. Z.). **The Use of Biometrical Methods in the Interpretation of Codling Moth Experiments.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 183–192. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: In this paper the use of statistical methods in the analysis of data of experiments on the codling moth, *Cydia* (*Carpocapsa*) *pomonella*, L., and the manner of determining the degree of confidence that can be placed in the results are described. The importance of defining the region to which the results of the field tests apply, of selecting typical orchards, and of measuring the homogeneity of the experimental areas is stressed. The usual methods of measuring variation are described and illustrated by experimental data, special attention being paid to the calculation of the probable error of a mean and standard deviation when the number of trees in a plot is less than 16. The influence of numbers on the confidence that can be placed in experimental plots is shown, and the author includes certain formulae that may be of use to investigators in entomology.

Davis (J. J.). **Estimating the Abundance and Damage by the San José Scale.**— *Jl. Econ. Ent.*, xvii, no. 2, 192–195. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: The gradual increase of San José scale, *Aspidiotus perniciosus*, Comst., is less likely to be recognised before it becomes a serious factor than many insects that appear suddenly or that cause immediately visible injury, nor is the relative importance of the loss of trees in comparison with an annual crop usually realised. The various types and degrees of injury must be taken into consideration in estimating abundance and damage, which may include a weakening or killing of the tree, spotting of fruit so as to make it unmarketable, and subjection of the trees to further insect and disease troubles following the weakening effect of the scale. Other factors entering into the problem are the vigour and resistance of individual trees and individual varieties to scale injury. The degree of infestation and method of making counts are reported. To reach a basis for estimating monetary losses, figures are given that enabled the author to estimate the crop loss to an acre of apples, if allowed to become badly infested, to be £200, and this even if the scale is eventually controlled and the trees brought back into thrifty condition, the

weakened effect, before and after control, being assumed to result in four years unproductiveness.

HUNTER (W. D.). **Methods of estimating Boll Weevil Losses.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 195–197. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: Probably more attempts have been made to estimate accurately the losses due to boll weevil, *Anthonomus grandis*, Boh., than have been made in the case of any other insect. Such estimates have been made by entomologists, crop reporters and commercial organisations. By far the most accurate estimates have been found to be those made by entomologists. A very accurate estimate can be made by comparing production on plots treated with calcium arsenate and on plots untreated. The difference in production is a precise measure of the amount of damage caused by the weevil. The usefulness of this method could be greatly increased by test plots provided by State Entomologists in different parts of their States. Estimates made by crop reporters have been found to show a strong trend toward exaggeration. Those made by commercial organisations are frequently coloured by market conditions.

LOCKWOOD (S.). **Estimating the Abundance of, and Damage done by Grasshoppers.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 197–202. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: Because of their extreme activity the numbers of grasshoppers are hard to estimate. By aid of a field glass the observer can stand at some distance and count those in a given unit. Many units of ground should be so counted in a field before an estimate of the grasshoppers can be made. A knowledge of the egg-laying habits is necessary before an estimate of the number of eggs in a locality can be made. Estimating the percentage of damage in a particular field is done by comparison of the amount of damaged seed in several small units with the undamaged seed

When making up a statement of the damage done by grasshoppers over a wide area, the entomologist should, when possible, compare the yield of damaged sections with the yield of localities where there were no grasshoppers but which had other limiting factors equal. A comparison of the yield during the grasshopper infestation with the yield in the same localities but in years when there were few, if any, grasshoppers, can be made, but before the entomologist can estimate the damage done by grasshoppers he must know the action, during the years under comparison, of the other limiting factors, such as rainfall, temperature, sunshine, winds, and crop diseases.

LARRIMER (W. H.). **The Application of Statistical Methods to the Determination of Abundance of and Damage by Hessian Fly.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 202–207. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: The discussion of the determination of abundance of Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say, is confined to methods used at the U.S. Entomological Field Station at West Lafayette, Indiana. Percentage and intensity of infestation are determined in the autumn as an indication

of the magnitude of the menace to autumn-sown wheat and the success of the control measures advised. A similar determination is made in the late spring to indicate the probable status of the Hessian fly menace to wheat sown the following autumn.

As yet no methods have been found acceptable for the determination either before or after harvest of the amount of damage done by Hessian fly.

The use of so-called statistics in studies of this nature as well as in other entomological investigations without appropriate consideration of the theory of probability is questioned.

SASSCER (E. R.) & WEIGEL (C. A.). **Recent Developments in Greenhouse Fumigation with Hydrocyanic-Acid Gas.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 214–222, 3 figs. Geneva, N.Y., April 1924.

A simple device is described, adapted for simultaneously dropping sodium cyanide into a number of generators, which proved practical in commercial greenhouses. Experiments made with liquid hydrocyanic acid in box fumigation used at the rate of $\frac{3}{4}$ to $2\frac{1}{2}$ ounces of sodium cyanide per 1,000 cu. ft. of space with an exposure of one hour are summarised in a table. Concentrations of $\frac{3}{4}$ oz. (or 15 cc. of liquid) proved effective against many common greenhouse insects such as *Idiopterus* sp., *Aphis* (*Illinoia*) *pelargonii*, *Myzaphis* sp., *Macrosiphoniella sanborni*, *Myzus persicae*, *Trialeurodes vaporariorum*, *Orthezia insignis*, *Chrysomphalus biformis*, *Coccus elongatus* and *Thrips tabaci*, but was insufficient against the immature stages of *Trialeurodes vaporariorum* or the adults and eggs of *Eriococcus azaleae* (azalea bark scale), *Pseudococcus citri*, or the eggs of *Coccus elongatus*.

Only on chrysanthemums, rose and Jerusalem cherry [*Solanum pseudocapsicum*] was slight scorching noticed. The results show that liquid hydrocyanic acid is as effective as the pot method of generating the gas.

The advisability of conducting this gas into a greenhouse, by means of a force pump, and then liberating it under pressure through a system of perforated pipes with adjustable nozzles permanently installed near the ridge of a house, is now being made the subject of a special investigation.

In testing the tolerance of *Kentia* and *Areca* palms, it was found that some scorching occurs if *K. belmoreana* is exposed for one hour to a concentration of $\frac{3}{4}$ oz. sodium cyanide or more per 1,000 cu. ft. with humidity ranging from 56 to 86 per cent. Fronds exposed to the light directly before and after treatment were more severely scorched. Wetting the plants prior to fumigation did not materially influence the results. New spikes are apparently not scorched, and there appears to be no difference in the tolerance of old and new fronds. *Areca lutescens*, though much more resistant, was somewhat scorched under unfavourable conditions, such as a humidity of 75 to 80 per cent., and exposure to strong sunlight after treatment.

At low temperatures 1 oz. of sodium cyanide per 1,000 cu. ft. was not effective against the eggs of *Pseudaonidia duplex*, Ckll. Concentrations of $2\frac{1}{2}$ oz. killed 100 per cent. of the soft brown scale *Coccus hesperidum*, L., and the chaff scale *Parlatoria pergandei*, Comst., but only partly controlled the larvae of *Gracilaria azaleella* (azalea leaf roller) and *Eriococcus azaleae*, Comst. Azaleas can stand as high a rate of concentration as 5 oz. per 1,000 cu. ft., though this caused scorching

of one variety. When the bracts of poinsettias have developed their intense red colour, they can stand 1½ oz.

Several tests have been made with calcium cyanide dust, this material being spread over damp newspapers in amounts equivalent to ½ oz.–1 oz. of sodium cyanide per 1,000 cu. ft., the plants being exposed to the gas for one hour. Two Aphids were used in these tests, *Macrosiphoniella sanborni* on chrysanthemums and *Aphis pelargonii* on geraniums. Many Aphids revived when brought into fresh air after exposure to dosages equivalent to ¾ oz. for periods up to 45 minutes. It is possible that the spreading of the dust on the moist paper caused a complex reaction that may have reduced the amount of hydrocyanic-acid gas actually released. Comparatively little injury was caused to susceptible plants by fumigation for an hour with calcium cyanide dust in dosage equivalent to 1 oz. of sodium cyanide per 1,000 cu. ft. This material can probably be adapted satisfactorily for greenhouse fumigation, the points requiring further investigation being the perfection of methods of application, the determination of the rate of evolution of gas under varying atmospheric conditions, and further knowledge of its insecticidal efficiency.

COMPTON (C. C.). **The Use of Lubricating Oil Emulsion on Greenhouse Scale Insects.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 222–225. Geneva, N.Y., April 1924.

Lubricating oil emulsion spray has proved effective in controlling Coccids on *Ficus* sp. and palms in greenhouses without foliage injury, when used at 1 per cent. strength. In large amounts the stock emulsion is used at the rate of 1½ gals. to 100 gals. water, but for smaller amounts 2 oz. to 1 gal. of water is satisfactory. Instructions are given for the preparation of the stock emulsion from the following formula: 1 U.S. gal. oil (sp. gr. 0·886—viscosity 365·3—volatility 4·9 per cent.), ¼ U.S. gal. water and 2 lb. potash fish-oil soap. The amount of soap depends on the hardness of the water.

The most destructive scales on various palms and *Ficus* sp. in Illinois greenhouses are *Chrysomphalus aonidum*, L. (Florida red scale), *Aspidiotus hederae*, Vall. (oleander scale), and *Eucalymnatus* (*Lecanium*) *tessellatus*, Sign. (tessellated palm scale), and on ferns, *Hemichionaspis aspidistrae*, Sign. (fern scale). The ferns suffered severely from scorching, but the only injury noticed was on the newly formed leaves of *Kentia belmoreana*, when they were sprayed with the emulsion at 1 per cent. strength on a very dark day following a period of cloudy weather. The temperature of the house at the time of application was 65°F. On bright sunny days an emulsion of 2 per cent. strength did not injure the foliage of *Kentia* sp., but this is not recommended, as the 1 per cent. strength gives a control of 95–100 per cent. This spray not only kills the young scales but loosens the old dead ones, so that eggs may be washed off by syringing under pressure.

WATSON (J. R.). **Control of Root-knot Nematodes on Florida Truck Farms.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 225–229. Geneva, N.Y., April 1924.

Starvation, soil fumigation and drowning are the methods discussed for the control of the root-knot Nematode [*Heterodera radicicola*, Greef] [*R. A. E.*, A, x, 361; xi, 197].

There appears to be considerable evidence of the existence of strains among Nematodes that have become adapted to certain crops. Thus land from which lettuce heavily infested with root-knot has been harvested may be immediately planted with celery, but these observations require careful verification by pot experiments.

Experiments with calcium cyanide both in dust and flake form indicate the possibility of substituting it for treatment with sodium cyanide followed by ammonium sulphate at a greatly reduced cost. The best method of application is to sprinkle it in the furrow when the land is ploughed.

It was found that the time required to drown the Nematodes was too long to make this method of much value. Soils continually under water for as much as six weeks still contained numbers of Nematodes, though fields submerged for four or five months were in all cases free.

SULLIVAN (K. C.). **The Use of Calcium Cyanide for the Control of Fleas and other Insects.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 230–237. Geneva, N.Y., April 1924.

Tests with calcium cyanide against various insect pests are described, indicating the possibilities of this material against both insects and other animal pests. It is believed that additional work will substantiate the results already obtained, but further experiments are needed before definite conclusions are drawn.

The tests described include the successful destruction of *Epicauta vittata*, F. (striped blister beetle) on vegetable crops by the application of a 50 per cent. dust. Calcium cyanide flakes used at the rate of one teaspoon per hill on squash and melon vines against *Diabrotica vittata*, F. (striped cucumber beetle) and *Anasa tristis*, DeG. (squash bug) killed both insects and plants, but it is considered possible that a dosage may be worked out that can be satisfactorily used. In very small quantities the dust proved effective against Aphids on melons and *Spiraea*. For the eradication of *Trialeurodes* (*Aleurodes*) *vaporariorum*, Westw., in greenhouses two applications are necessary; leaf injury was only noticed in cases where the calcium cyanide came in direct contact with the plant. There is every reason to believe that it will become the standard remedy for this whitefly in greenhouses.

Experiments for the fumigation of nursery stock infested with *Aspidiotus perniciosus*, Comst. (San José scale) indicate that calcium cyanide used at the rate of 1 oz. to 100 cu. ft. is as effective as the same amount to 25 cu. ft. The results after 30 minutes' exposure to the above strength were equal to those after 2 hours. The weaker concentrations require a longer exposure, 1 oz. to 200 or 400 cu. ft. requiring $1\frac{1}{2}$ and 2 hour periods respectively.

This method is not recommended, however, until further data have been obtained as to its effect both on the scale and the plants.

SAFRO (V. I.). **The Price of Insecticides.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 238–245. Geneva, N.Y., April 1924.

This is a practical discussion from the standpoint of the salesman and manufacturer, designed to assist the purchaser and to aid in producing more satisfactory conditions.

Chandler (S. C.). **Some recent Developments in the Use of Paradichlorobenzene.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 246–251, 1 fig. Geneva, N.Y., April 1924.

Experiments and observations on *Aegeria exitiosa* in peach trees in Illinois during the past four years have brought out the following facts about paradichlorobenzene. Grass and weeds need not be removed from around the base of the tree before applying the chemical. Heavy rains just before or just after treatment do not appear to affect the action of the gas. One-year-old trees have not been injured when treated with paradichlorobenzene in the proper manner. It is not necessary to remove dirt from around the trees after treatment. Up to the present time there have been no injurious cumulative effects of this substance in Illinois. No injury has been observed when a few crystals have come in contact with the bark, but if the paradichlorobenzene is packed closely against the bark, it will kill a large percentage of the trees. The applications recommended are ¾ oz. for trees from one to five years of age and 1 oz. for trees six years old or more. As much as 2 oz. may be profitable for 12 year old trees. No injury was observed in treating eight year old apple trees with ¾ oz. paradichlorobenzene against *Saperda candida*. In six trees seven live borers and seven dead ones were found. The live ones were usually those deepest in the wood, and especially those that had worked highest up.

Snapp (O. I.). U.S. Bur. Ent. **Three Years of Paradichlorobenzene Experiments in the South.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 253–259. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper : Paradichlorobenzene treatment of peach trees for the control of the peach borer, *Aegeria exitiosa*, Say, has become an annual practice in Georgia. Five hundred thousand pounds of the material were used in the Southeast during 1923. The results of experiments indicate that under normal conditions large doses exposed for short periods are not so effective as smaller ones exposed for four to six weeks. No tree injury resulted from the use of the various doses around three, four and five year old peach trees in Georgia during 1921 and 1922 when normal weather conditions prevailed. However, during the 1923 season a shortage of rain occurred accompanied by abnormally high temperatures. These unusual weather conditions caused a rapid action of the gas, and as a result some rather severe injury appeared on three year old trees from the use of the ¾ and 1 oz. doses. During each of the three years no injury resulted from the ¾ oz. dose around four and five year old trees for 28 days. One and two year old trees have shown, each year, more or less injury from the use of the ½ and ¾ oz. dose. No injury has been revealed from allowing the mounds to remain around the trees over winter. Late October and November applications of paradichlorobenzene gave control of about 75 per cent. December applications were worthless. Applications made about 1st April in Georgia gave about 75 per cent. control. Laboratory experiments show that the gas is liberated at about the same rate in both sandy loam and clay soils. Tests in the laboratory have repeatedly shown that the higher the moisture content of the soil and the lower the temperature, the slower is the action of the gas on the borer [*cf. R. A. E.*, A, xi, 534].

GUYTON (T. L.). **Oriental Fruit Moth in Pennsylvania in 1923.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 259–260. Geneva, N.Y., April 1924.

Cydia (*Laspeyresia*) *molesta*, Busck (Oriental fruit moth) occurred during 1923 in Pennsylvania for the first time as a serious pest. In most cases the losses amounted to 20 per cent., and in one as much as 75 per cent. of the peach crop was destroyed. It has so far only been recorded from the south-eastern quarter of the State. Quinces appear to be the favourite food-plant and were entirely destroyed in the infested area. Very few observations were made on the life-history. A definite brood was observed during the last week in August, and the larvae produced by these adults caused serious injury to Elberta peaches. Active larvae were found in fallen quinces as late as 5th November.

FLINT (W. P.). **A New Apple Pest,** *Metachroma interruptum.*—*Jl. Econ. Ent.*, xvii, no. 2, pp. 260–261. Geneva, N.Y., April 1924.

The Eumolpid, *Metachroma interruptum*, Lec., is a western species feeding on willow, but has recently been found attacking apple and peach in Illinois. The beetles feed on the fruit at night from the end of June to about the 20th July. In confinement they will also feed on the leaves. In cage experiments the beetles were not killed by 1 lb. lead arsenate to 50 U.S. gals. water as used against the codling moth, and though repelled by it, they would return to the sprayed foliage after 24 hours if no other food was available. In these experiments 3 and 4 lb. of lead arsenate to 50 U.S. gals. water killed the beetles after about 48 hours.

FROST (S. W.) & CRAIGHEAD (E. M.). **Dusting for Leaf-hoppers** (*Empoa rosae*, **L.**) **in bearing Apple Orchards.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 262–264, 1 pl. Geneva, N.Y., April 1924.

A considerable amount of loss to the apple crop in Pennsylvania is due to injury by leafhoppers, *Empoa rosae*, L. Not only do the adults attack the leaves, but the value of the fruit is greatly reduced by the spotted appearance resulting from the liquid discharge from the nymphs. A 2 per cent. nicotine sulphate dust and 1¼ or 2 per cent. free nicotine dusts killed a large proportion of the nymphs and adults. Further observations are necessary in order to discover whether one or two applications of nicotine dust during June will keep this pest under control. The cost of the material would prohibit a larger number of applications.

GOSSARD (H. A.). **Should the Midsummer Apple Spray be timed for the Second Brood only of Codling Worm?**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 265–266. Geneva, N.Y., April 1924.

This information has been stated in greater detail in a bulletin previously noticed [*R. A. E.*, A, xi, 458]. The tentative conclusion is reached that when the season is late, the summer spray should be earlier than usual instead of later, to destroy the late individuals of the first brood larvae of *Cydia pomonella*. The poison will often last long enough ln summer weather to kill the bulk of the summer-brood larvae, but a later second summer spray may be desirable in such a year.

PARROTT (P. J.). **Some Side-lights on Spray Injuries to Apple Fruits and Foliage.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 267–274. Geneva, N.Y., April 1924.

Lime-sulphur is one of the most satisfactory spraying mixtures for the treatment of apples, its chief defect being the injury caused to foliage and the russeting of apples. The degree of injury apparently varies in different apples and according to seasonal conditions. No satisfactory substitute for lime sulphur has been discovered, though in this connection "wettable sulphur" mixture should be further tried.

The addition of various substances did not materially reduce the injury. Though the addition of hydrated lime reduced scorching of foliage to an appreciable extent, it did not prevent serious damage in some instances. With calcium caseinate both types of injury were also still conspicuous. As the latter material prevents any important reaction between lime-sulphur and lead arsenate, and hydrated lime neutralises the soluble arsenic developing from this combination, it would appear that sulphur is largely responsible for the damage to apple foliage and fruit and that sulphur contained in sulphides is more injurious than ground sulphur or sublimed flowers of sulphur applied as dusts or in suspension [*cf. R. A. E.*, A, xii, 275]. Under the circumstances therefore every care must be taken to follow out instructions in applying lime sulphur. The minimum effective amount of spray should be used, and the mixture should be applied as soon as possible after the addition of the lead arsenate. Spraying should not be done at high temperatures.

STEARNS (L. A.) & HOUGH (W. S.). **Spreader Tests on Apples and Peaches: A Second Report.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 274–278. Geneva, N.Y., April 1924.

Subsequent experiments confirm those of the previous year [*R. A. E.*, A, xi, 334], the conclusion being that a calcium caseinate spreader (Kayso) in the apple and peach sprays under orchard conditions in Virginia is not justified from the standpoints of effectiveness and economy.

HARTZELL (F. Z.). **The Estimation of Dosage for Volatile Dusts: An Illustration of the Value of Correlation Mathematics to Entomology.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 279–285. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: The term volatile dust is proposed for materials that kill insects by the evolution of toxic gases. It is suggested that dosage with such preparations be defined as the number of cubic feet of *tree volume* and *tree space* occupied by one pound of dust. Experiments with volatile dusts for the control of pear psylla [*Psylla pyricola*, Först.] in western New York, have indicated that, for this insect, on the basis of tree volume, one pound of dust should not occupy a space of more than 1,500 cu. ft., and on the basis of tree space the maximum volume should be 1,900 cu. ft. Correlation and partial correlation calculations were used to study the relation of efficiency to dosage, temperature, and percentage of *open*

space (the difference between tree space and tree volume). Dosage was found to exert the greatest influence. The effect of temperature was not so marked as laboratory studies indicate, and this was, doubtless, due to the increased convection currents and decreased humidity that usually accompany a rise in temperature under field conditions.

Davis (J. J.). **Comparative Tests with Dormant Sprays for San José Scale Control.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 285–289. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: This is a record of outstanding results obtained for three years (1921–1923) with lime-sulphur and oils as dormant sprays for the control of the San José scale, *Aspidiotus perniciosus*, Comst. Lime-sulphur did not give a sufficient kill to check the scale, which corroborated the results obtained by commercial orchardists in southern Indiana [*cf. R. A. E.*, A, xi, 302]. Lime sulphur is still an effective scale control in most sections of northern Indiana. Dry lime-sulphur was about as effective as the concentrated liquid, provided it was used at one and one-half to two times the strength recommended by the manufacturers. Under the conditions of the past few years in most of southern Indiana, the oil sprays are the only ones that have given satisfactory control. These include the miscible oils, " petroleum soaps," and oil emulsions. The summer use of oil emulsion cannot be recommended to take the place of a dormant spray, although under certain conditions a summer application materially assists in checking scale.

Lathrop (F. H.) & Trask (V.). **Further Studies of Prune Root Borer Control in Oregon.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 290–295. Geneva, N.Y., April 1924.

The materials discussed in connection with the control of *Aegeria* (*Sanninoidea*) *opalescens*, Edw. (prune root borer) are paradichlorobenzene and naphthaline whitewash [*cf. R. A. E.*, A, xi, 13]. Besides the flake naphthaline various mixtures of naphthaline and paraffin (commercial grade with melting point about 48°C. [118·4°F.]) were tried, the best results being obtained with a combination of naphthaline paraffin 1 : 1 added in the same quantity as the flake naphthaline (1 lb.) to the basic formulae [*loc. cit.*]. No injury to the trees occurred where the washes were applied in connection with paper collars or protective washes, the formula for the latter being 4 lb. quicklime, 2 oz. copper sulphate, 4 oz. glue, 1 lb. powdered charcoal and water to form a thick paint. The naphthaline wash is applied to the crown and the trunk of the tree, after the protective wash has dried, to a height of 14 to 16 inches. The soil is replaced about the base of the tree.

Paradichlorobenzene applied at the rate of 1 oz. round the base of the tree during the first week in September gave excellent results if left undisturbed until the following spring. In no case was injury observed in healthy trees, but the treatment apparently hastened the death of trees weakened by crown rot or root rot fungi, and even ½ oz. doses are too strong for trees of 2 years and under. Larvae situated in the mound some distance above the soil level were not affected by the treatment. The action of the material is considerably influenced by the type of soil, being much quicker in light soils than in heavy ones.

De Long (D. M.) & Mathewson (A. A.). **The Houghton Gooseberry Aphis** (*Myzus houghtonensis*) **as a Pest in Ohio.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 295–298, 1 pl. Geneva, N.Y., April 1924.

Myzus houghtonensis is causing considerable injury to gooseberry plants in Ohio, forming galls composed of many small, tightly curled leaves. The Aphid overwinters in the egg, which is deposited on the canes near the ground or on the bark, buds, old leaves or thorns. As many as ten eggs may be found in the bud scales. The eggs hatch about 10th April, when the buds are bursting. The wingless females continue producing living young and form new galls until about 17th May, when the migrating winged females appear. Migration continues for three or four weeks, the Aphids disappearing almost completely from the plants during that time. Towards the end of June the young Aphids were again found on the gooseberries, forming galls upon the laterals and terminals, and a series of at least eight wingless generations was produced throughout the summer and autumn. In October a winged generation appears that either deposits the overwintering eggs or produces a wingless generation that deposits them. There is some doubt regarding this point, as the winged females in the cages deposited eggs on the canes and no wingless forms were found, whereas preserved winged females appear to exhibit wingless forms within their bodies. It is evident that this Aphid can and normally does live upon gooseberry throughout the entire growing season in injurious numbers. Although there may be an alternate food-plant on which part of the life-cycle is spent, it is possible that the Aphid only migrates to another individual of the same food-plant during the winged stage.

The larvae of a small Syrphid fly were the only natural enemies observed. No adequate control measures have so far been devised.

Headlee (T. J.). **Certain Dusts as Agents for the Protection of Stored Seeds from Insect Infestation.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 298–307. Geneva, N.Y., April 1924.

The following is part of the author's abstract of this paper: Common white edible beans are protected from subsequent attack by the common bean Bruchid, *Bruchus obtectus*, when mixed in proper proportions with ground burned lime (CaO), hydrated lime ($Ca(OH)_2$), calcium chloride ($CaCl_2$), calcium sulphate ($CaSO_4$), dolomite, or various clays. The protection afforded by these materials is most marked in the case of Milltown Ball clay no. 9, and seems not to be connected with atmospheric moisture or the chemical state of the dust materials. The protective ability of these materials appears to be correlated with the degree to which they exhibit a colloidal character. This physical character seems to operate by preventing the larva of the bean Bruchid from obtaining sufficient hold upon the surface of the bean seed to drill its way into the bean. Milltown Ball clay no. 9, which is the most colloidal of the dust materials worked with, appears also to afford protection to wheat and shelled maize from subsequent attack by the Angoumois grain moth, *Sitotroga cerealella*. This clay apparently also has an insect reducing power when not in direct contact with the immature stages of the insects themselves. This power appears both in the case of the bean weevil and the Angoumois grain moth.

GUYTON (T. L.). **Notes on the Use of Chlorine Gas as an Insecticide.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 307–308. Geneva, N.Y., April 1924.

Experiments have been made with chlorine gas for the control of *Sitotroga cerealella* (Angoumois grain moth). The germination of the treated wheat was greatly reduced, and the insects were only slightly affected. In one case, where the moisture test of the grain was 17 per cent., the sample was completely destroyed by charring.

BRITTON (W. E.). **An Asiatic Beetle** (*Anomala orientalis*) **in Connecticut.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 309–310. Geneva, N.Y., April 1924.

Anomala orientalis, Waterh., was found on weeds and grass in a nursery in Connecticut during 1920 and 1921, and infesting lawns in 1922. The latter were close to an area previously occupied by a nursery that several years previously imported many plants from Japan. It was probably introduced during that time. It is a serious pest of sugar-cane in Hawaii. Should it become established in the United States, it may prove as injurious as *Popillia japonica*, Newm., is in New Jersey.

SMITH (R. C.). *Caenurgia erechtea* (**Cram.**) (**Noctuidae**) **as an Alfalfa Pest in Kansas.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 312–319, 1 fig. Geneva, N.Y., April 1924.

Caenurgia erechtea, Cram. (forage looper) is common in lucerne, clover and pastures in Kansas, occasionally occurring in large numbers, It overwinters in the pupal stage, though possibly some of the half-grown larvae may survive the winter. In Kansas there are three generations of approximately one month's duration each and a partial fourth. The majority of the larvae of the latter are destroyed by the cold in November and December. The eggs are deposited singly or in groups on any part of the plant, particularly on the leaves. They hatch in from 4 to 6 days. The larval stage lasts from about 15 to 36 days, followed by a prepupal stage of from 1 to 9 days. When abundant the larvae may entirely defoliate the plants. The pupal stage in the summer lasts from 10 to 13 days. In the field, pupae sometimes occur among the leaves of the plant, but most commonly under the plant among the rubbish on the surface of the ground. The overwintering pupae are found below the soil at a depth of about two inches. The various stages are described.

Artificial control has so far never been necessary, but under experimental conditions it was found that most larvae perish when the crop is mowed. They may be killed by the heat in the hottest part of the summer in 20 minutes or may be destroyed by predacious enemies, which include certain Nabids, Reduviids and birds.

The eggs under laboratory conditions are parasitised by *Trichogramma minutum*, Riley. The larvae are parasitised by Tachinids, *Winthemia quadripustulata*, Wied., having been obtained from them three times, but this parasitism does not appear to be an important factor. They are also subject to a bacterial wilt, which is, however, dependent on weather conditions.

McColloch (J. W.). **The Time of Planting Corn as a Factor in Corn-ear Worm Control.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 320–323. Geneva, N.Y., April 1924.

The relation between time of planting maize and injury by *Heliothis obsoleta*, F. (corn ear worm) has been studied from various aspects during the past ten years in Kansas. The results are briefly discussed. As a rule the dates of minimum injury and maximum yields coincide. The 1st May appears to be the optimum date for planting maize, though the results secured in the various phases of the investigation indicate that this date lies somewhere between 15th April and 1st May. Experiments are now in progress in order to determine the exact date for each variety of maize under Kansas conditions.

Haseman (L.) & Bromley (S. W.). **Controlling Chinch Bugs in Missouri with Calcium Cyanide.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 324–329. Geneva, N.Y., April 1924.

The following is the author's abstract of this paper: The results secured from the use of calcium cyanide for destroying chinch bug [*Blissus leucopterus*, Say] at wheat harvest are given. Calcium cyanide did not prove practical when sown broadcast in infested wheat fields or when applied as a line barrier on the surface of the ground. In tests where it was applied in a narrow strip or trap crop between wheat or maize fields it proved promising. The best results, however, were secured when the material was distributed in a narrow line in the bottom of a deep narrow furrow such as is made with a plough. The furrow should have practically a vertical wall next to the crop to be protected, with a line of chemical placed at the foot of it. One pound of calcium cyanide flakes to each sixty linear feet of furrow, applied in the afternoon, when a heavy migration of bugs began, proved effective in destroying them for the rest of the day. This costs about 16s. a day for the material used in a quarter of a mile of barrier.

Wakeland (C.). **New Developments in Alfalfa Weevil Activity and Control.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 330–337, 3 charts. Geneva, N.Y., April 1924.

For the control of *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.), the usual recommendation is to apply one arsenical spray at the "turning point of injury," which occurs close to the date when the greatest number of larvae are emerging, usually from one to three weeks before the date of cutting the first crop of lucerne; by this means the first crop sustains little injury, and the second crop grows immediately after the cutting of the first.

In south-western Idaho this method has proved less successful than elsewhere, apparently owing to the variation in seasonal habits of the larvae in these localities. In experiments with calcium arsenate under such conditions it has been found that two sprays applied to the first crop are necessary to afford protection. In certain sections of the State and in certain seasons even in south-western Idaho the single spray will probably prove sufficient, but with the spread of the weevil to still lower and warmer regions other adaptations of control may be necessary.

Smulyan (M. T.) & Webber (R. T.). U.S. Bur. Ent. **Observations on an Outbreak of** *Utetheisa bella* **L.**—*Jl. Econ. Ent.*, xvii, no. 2, pp. 337–339. Geneva, N.Y., April 1924.

The Arctiid, *Utetheisa bella*, L., occurs throughout the Atlantic States, and has been recorded as feeding on cherry, elm, *Myrica*, *Lespedeza* and *Crotalaria*. During recent observations in New Jersey it was only found on *C. sagittalis*, though some of the other reported food-plants occurred in the infested localities. The infestation of this uncultivated food-plant was so heavy that it was wiped out in one season, with the result that the insect itself also disappeared.

Brisley (H. R.). **Blister Beetle—Serious Pests in Northern Arizona.**—*Jl. Econ. Ent.*, xvii, no. 2, p. 343. Geneva, N.Y., April 1924.

During 1922 blister beetles occurred in unusual abundance on cultivated crops in certain localities of Arizona. Three species are concerned, two of which are recorded for the first time from Arizona. *Macrobasis longicollis*, Lec., completely defoliated small potato fields and even where lead arsenate sprays were applied at the first appearance of the beetles, a large amount of damage was done. This spray was, however, more effective against *Epicauta corvina*, Lec., which, though attacking potato, occurred in equal numbers on its native food-plant *Tribulus terrestris*.

E. pardola, Lec., was found in large numbers during June on lucerne and potato, in some instances as many as 50 beetles occurring on a single plant. They feed on the tender leaves and buds, necessitating an early cutting of the crop.

Jones (W. W.). **Thrips on Box Elder.**—*Jl. Econ. Ent.*, xvii, no. 2, p. 345. Geneva, N.Y., April 1924.

During 1922 considerable injury was done to box elder [*Acer negundo*] by thrips in Utah. The leaves became discoloured, and in some cases the trees were defoliated. The most seriously affected leaves were generally high up in the tree. Similar injury occurred again in 1923 and was also reported from Arizona. The species has provisionally been referred to *Scirtothrips citri*.

Holloway (T. E.) & Haley (W. E.). U.S. Bur. Ent. **Suggestions for the Control of the Sugar-cane Moth Borer.**—*Facts about Sugar*. New York, 3rd May 1924 ; also in *Louisiana Planter & Sugar Mftrer.*, 3rd May 1924. [MS. 3 pp. f'scap. Received 19th May 1924.]

A résumé is given of work done in recent years in connection with the sugar-cane moth borer [*Diatraea saccharalis crambidoides*] in Louisiana. The suggestions for control of the borer in small plantings have largely been noticed [*R. A. E.*, A, xi, 110, 254]. During the winter, all standing *Sorghum*, etc., should be cut and used or destroyed, and the stubble ploughed under. Sugar-cane and *Sorghum* should be planted at some distance from maize, as this is the favourite food-plant of the borer. On large plantations many of the above remedies are not practicable, and further suggestions are to obtain seed from comparatively uninfested fields, which can often be found in the less perfectly drained part of the plantations. As an alternative to hot water treatment of seed cane, planted fields on well drained ground

might be flooded for 24 to 72 hours before the cane starts to grow in the spring. Maize should not be grown on sugar plantations. The leaves or rubbish should not be burnt after grinding, in order to preserve the parasites present in them. Plant-cane fields should be isolated from stubble fields ; it is thought that if they were separated, even only by a road, the infestation would be largely confined to the plant cane, and when this was ground in autumn, many borers would be destroyed. In the following year, stubble cane would be growing in place of the plant cane at one side of the plantation, and at the other side (on fields previously devoted to maize or a cover crop) plant cane from clean seed would be growing.

BURROUGHS (A. M.). **A New Method of making Engine Oil Emulsions.** —*Missouri Agric. Expt. Sta.*, Bull. 205, 8 pp., 4 figs. Columbia, Mo., August 1923. [Received 21st May 1924.]

Recent experiments have shown that cold emulsions made without the use of potash fish-oil soap [*R. A. E.*, A, xii, 83] give practically the same results against San José scale [*Aspidiotus perniciosus*, Comst.] as the ordinary oil-soap emulsions [*R. A. E.*, A, xi, 337]. As far as trials have been made, concentrations up to 10 per cent. showed no injury to trees when applied during the dormant period. A 2 per cent. strength seemed to be efficient and was used without injury up to the cluster bud stage. A particularly successful formula was composed of 2 U.S. gals. engine oil to 1 U.S. gal. of water with 4 oz. calcium caseinate (Kayso), copper-sulphate or saponin.

Departmental Activities : Entomology.— *Jl. Dept. Agric. Union S. Africa*, viii, no. 4, pp. 358–359 & 363. Pretoria, April 1924.

Attempts are being made to establish a trade with England in beetles of the genus *Mylabris*. The indigenous African beetles are considered to yield a greater percentage of cantharidin than the Spanish fly [*Lytta vesicatoria*], and they are particularly abundant in the thorn-veldt, feeding on the flowers of various species of *Acacia*. They are also active garden pests destroying the leguminous flowers.

The following insects are recorded as attacking sunflower seed heads : *Heliothis* (*Chloridea*) *obsoleta* (American bollworm), *Agonoscelis versicolor* (larger cluster bug), *Nysius binotatus* (grain bug), *Lygaeus militaris* and a Scutellerid, *Callidea dregei*. Considerable damage to cabbage has been caused by *Adoretus cribrosus* in Natal.

As a result of weather conditions the cotton aphis [*Aphis gossypii*] was particularly injurious, other cotton pests, which caused serious damage to seedling cotton in various districts, are cutworms ; a weevil, *Protostrophus amplicollis* ; a grasshopper, *Zonocerus elegans* ; a Eumolpid, *Syagrus rugifrons* ; a moth, *Xanthodes graellsi* ; and a Tenebrionid, *Gonocephalum simplex*. The Sudan bollworm [*Diparopsis castanea*] was also very prevalent, particularly in neglected cotton fields, and the need for careful attention to cultural operations is pointed out.

Experiments carried out by L. B. Ripley indicate the value of sodium fluoride as a poison in cutworm bait, as it combines the advantages of high toxicity with slight repellent action. Under laboratory conditions it has also given good results against locusts. It is cheaper than arsenicals and much less poisonous to higher animals.

Symes (C. B.). **Insect Pests of Cotton.**—*Rhodesia Agric. Jl.*, xxi, no. 2, pp. 136–151, 4 pls. Salisbury, April 1924.

Cotton is being grown as a new crop in Rhodesia, where over 50 species of Malvaceous plants already occur, including some 25 species of *Hibiscus*, so that many of the well-known pests of cotton are probably present. A short account is given of each of the more usual pests occurring in other countries, with the most successful remedies against them. Neither of the two chief pests, *Platyedra gossypiella* (pink bollworm) or *Anthonomus grandis* (cotton boll weevil), as yet occur in Rhodesia, and the importance of preventing their entry in imported seeds is pointed out, as well as the necessity of enforcing and upholding the strict import regulations imposed by the government.

Locust Invasion of Southern Rhodesia.—*Rhodesia Agric. Jl.*, xxi, no. 2, pp. 190–192. Salisbury, April 1924.

Large bodies of *Locustana* (*Locusta*) *pardalina*, Wlk., appeared in Southern Rhodesia in February 1924, and an account is given of measures to be taken against them. The formula used for producing a smoke barrage is described [*R.A.E.*, A, xi, 494]. Such mechanical means of destruction as rollers on even ground and brush drags on uneven ground are also recommended, as well as collecting the insects at night or early morning. For poisoning, the use of sugar or molasses in the bait is now considered unnecessary; for young hoppers, 1 lb. sodium arsenite (80 per cent.) with 20 gals. of water is recommended; for half-grown hoppers, 1 lb. to 15 gals., and for full-grown ones 1 lb. to 10 gals., should be sprayed on the grass in a fine mist.

[Anderson (T. J.)]. **The Coffee Mealybug.**—*Farmers' Jl.*, vi, no. 16, p. 21, 2 pls. Nairobi, 17th April 1924.

Attention is called to the coffee mealybug [*Pseudococcus perniciosus*, Newst. & Willc.], which has become a very serious pest in several districts of the Colony. The life-cycle varies from 36 to 44 days, all stages of the insect being found together on the bushes all the year round. Coffee, cacao, crotons, pigeon pea [*Cajanus indicus*], and several species of grasses are attacked. Wind is the chief means of dispersal, though insects, birds and transplanting all contribute to spread infestation. Where the mealybugs are present in large numbers, flowers and newly-set coffee berries drop off. Leaves and twigs also become malformed and drop, the roots are weakened by constant loss of sap, and sooty mould forms on the leaves. A few Coccinellids are present, but in too small numbers to be an efficient control. Ants protect the insects from their natural enemies and should be eradicated as far as possible.

Various remedies for mealybugs that have been recommended in other countries are quoted.

Anderson (T. J.). **Annual Report of the Division of Entomology.**—*Kenya: Ann. Rept. Dept. Agric. 1922*, pp. 105–110. Nairobi, 1924.

The most important insect pests of coffee during the year were the caterpillars of an unidentified moth, which have defoliated over 100 acres in one district, transferring their attack to coffee from maize.

Handpicking was the only practical remedy. The Limacodid, *Parasa vivida*, Wlk., was reported from several districts, but in small numbers. The beetle, *Gonocephalum simplex*, F., is widely distributed and seems to attack every variety of crop. It eats the bark of coffee, especially of young trees, just at or below soil level, and climbs and eats the soft green bark of primaries and laterals, sometimes completely ring-barking them. It is fairly easily controlled by the use of poison bait.

Two new species of weevils have been reported eating coffee leaves—one a species of *Mecostylus*, and the other of *Peritmetus*. *Thliptoceras octoguttalis*, Feld. (coffee berry moth) has been reported from several districts, the primary branches being so affected in some cases that the berries dropped off when touched, or the branches were sometimes gnawed away.

The black borer [*Apate monacha*, F.] and the yellow-headed borer [*Dirphya princeps*, Jord.] have been recorded from several districts. Clearing adjoining virgin bush and the use of carbon bisulphide have much reduced their numbers. *Antestia lineaticollis*, Stål (coffee bug) has done considerable damage in some instances; it has also been found feeding on roses and *Citrus*. *Diarthrothrips coffeae*, Will., has been troublesome where climatic conditions are favourable; it can, however, be almost completely controlled in its initial stages by spraying with a fairly weak solution of lime-sulphur. *Toxoptera coffeae*, Niet. (coffee aphis) seems to be increasing in spite of natural parasites. Green scale [*Coccus africanus*, Newst.], which has been considered a minor pest, has spread considerably in one district, and is being investigated.

HARGREAVES (H.). **Annual Report of the Government Entomologist.**—*Uganda Ann. Rept. Dept. Agric. 1922*, pp. 29–32. Entebbe, 1924.

Antestia lineaticollis, Stål (coffee bug) is the most serious pest of coffee. Outbreaks of it appear to be occurring more frequently, and the annual loss to planters is estimated to exceed £15,000. The collection of all stages and the breeding of parasites do not appear to be uniformly successful, indicating that the bug migrates from surrounding breeding places, though it has not yet been found on any food-plant other than coffee. *Stephanoderes hampei*, Ferr. (coffee berry borer) was found in large numbers on several estates. *Pseudococcus citri*, Risso (root mealy bug) continues to be a serious pest, the ant, *Acropyga gowdeyi*, Wheeler, probably being partly responsible for the reinfestation of coffee roots. Tobacco soap solution is only temporarily effective against it and has to be repeated about every 3 months. *Metadrepana glauca*, Hmp., eating the foliage, has been controlled by hand collection and spraying. *Diarthrothrips coffeae*, Will., can only be controlled by spraying. The coffee trees that are attacked by *Bixadus sierricola*, White (stem borer) are those adjacent to forest land. The larvae feed for a time in the bark on the lower part of the stem and then bore into the wood, making large burrows. The stem may be ringed, and the plant soon dies. In advanced cases stumping may be necessary, but where the mechanical strength of the stem has not been appreciably affected, carbon tetrachloride, carbon bisulphide or petrol may be injected into the burrows, which should be subsequently plugged with clay. Cut stems or dead trees should be burnt at once. A leaf eating weevil, *Isaniris* sp., is recorded for the first time on coffee in Uganda; handpicking or spraying with

lead arsenate or Paris green is recommended for its control. Other pests of coffee are *Pseudococcus virgatus*, Ckll., *Asterolecanium coffeae*, Newst., and the Noctuid, *Achaea catocaloides*, Gn. The latter is apparently a general feeder, living normally in the forest, from which it spreads to coffee, maize and beans, being particularly injurious to coffee. On this crop it was controlled by dusting with Paris green and burning the bush vegetation between the forest and the coffee.

The cotton pests recorded are *Earias insulana*, Boisd. (bollworm), which has also been bred from different species of *Hibiscus* ; *Aphis gossypii*, which is preyed upon by the adults and larvae of the Coccinellids, *Chilomenes vicina*, Muls., and *C. lunata*, F. ; the cotton-stainers, *Oxycarenus rufiventris*, Germ., *O. fieberi*, Stål, *O. hyalinipennis*, Costa, the latter occurring also on *Hibiscus cannabinus*, and *Dysdercus nigrofasciatus*, Stål, found on the fruits of *Abutilon indicum* ; *Coryna apicicornis*, Guér., and another beetle of this genus, not of very great importance as pests ; and an unidentified Aleurodid.

A Coccid not hitherto recorded was found infesting the roots of tea. A great deal of damage was done to sweet potatoes by *Acraea acerata*, Hew. *Busseola fusca*, Hmp., is recorded for the first time as a stem-borer in maize in Uganda. An unidentified stem-boring caterpillar and a Buprestid were found attacking the rain tree (*Pithecolobium saman*).

Cleare (L. D.). [**Report of the Economic Biologist.**]—*British Guiana : Rept. Dept. Sci. & Agric. 1922*, pp. 36–39. Georgetown, 1924.

Much of this information concerning moth borers and other insects has already been noticed [*R.A.E.*, A, xi, 113, 291]. *Castnia daedalus*, Cram. (giant borer), is probably the most serious pest of coconut palms in British Guiana. It also attacks aeta palm (*Maurita flexuosa*), which is probably one of its natural food-plants. Up to the present very little is known about this moth, and no methods of dealing with it have been devised.

Kirkpatrick (T. W.). **The Egyptian Cotton Seed Bug** (*Oxycarenus hyalinipennis*, **Costa). Its Bionomics, Damage and Suggestions for Remedial Measures.**—*Minist. Agric. Egypt*, Tech. & Sci. Service, Bull. 35, 107 pp., 45 figs. Cairo, 1923. [Received 29th May 1924.]

Oxycarenus hyalinipennis, Costa (Egyptian cotton-seed bug) occurs throughout Lower and Middle Egypt and the north of Upper Egypt abundantly, becoming less common towards the south. It is also abundant in the cotton-growing districts of the Sudan. The limiting factor is probably high temperature. Nearly 97 per cent. of the Egyptian cotton crop is grown in areas where the insect is numerous. Of the 17 food-plants listed on which it breeds in Egypt, the most important are cotton, *Hibiscus esculentus* and *H. cannabinus*, and all are Malvaceous plants except *Sterculia diversifolia*. Breeding takes place only when the seeds of one of the food-plants are available for food ; on cotton it begins as soon as the first bolls open. Oviposition begins very soon after mating, the eggs being laid on the lint or the green bolls, the average number per female (when fed on cotton) being about 20. The incubation period varies with the temperature, from just under 4 days at the optimum of about 95° F., to 43 days

at 58° F.; there is an indication of a slight increase in the period between the optimum and the maximum temperature of 100° F., above which they fail to hatch. The 5 nymphal stages occupy from 2 weeks upwards, according to the temperature; the whole life-cycle, from egg to egg may be completed within 20 days. There are certainly 3, and most probably 4, generations in a season. At the end of the breeding season the adults remain quiescent, some at first on cotton, then on the trunks, branches and leaves of various trees, grasses or weeds. They are never all completely inactive throughout the winter, but do not then feed on cotton seed. In April, when the young cotton is well up, many of the bugs leave their former resting-places and take refuge on the young cotton plants, but do not feed on them; from this time onwards breeding begins as soon as any Malvaceous seeds are available. In cases of heavy infestation, as many as 749 adults and nymphs have been found within a single boll. On *H. esculentus*, breeding begins as soon as the capsules are ripe, an average of 30 eggs per female being laid on them. On *H. cannabinus*, the bugs appear to be able to penetrate to the seeds of unripe capsules, and breeding may begin before the seeds are actually ripe. On *H. mutabilis*, breeding takes place during the winter, as the plant does not come into flower at Gîza (where most of these observations were made) until October or November. On hollyhock and *Sida mollis*, the breeding season is from April to July; by the end of July quiescent adults only can be found. On three cultivated species of *Abutilon* (*A. fruticosum*, *A. thompsoni* and *A. venosum*) breeding starts about April, the adults feeding on the unripe seeds. On *S. diversifolia* breeding lasts from July to November, the adults remaining quiescent in the old capsules for the remainder of the year, and only about 10 eggs are laid per female.

The proportion of sexes is about 40 males to 60 females, but this varies greatly according to time of year, habits of the bugs and food-plants. Males are more able to resist extremes of temperature, but females are more resistant to unfavourably low relative humidities. At 86° F. and below, humidity approaching saturation is the optimum for longevity, but above that temperature a drier atmosphere is more favourable. The bugs of the last generation of a breeding season are unable to reproduce until either a considerable period of rest has intervened or there is a stimulus of temperature well above the normal. The weight of the bugs decreases steadily from the end of one breeding season to the beginning of the next, this decrease not being checked in the case of bugs migrating to young cotton plants in spring. Although there is little if any transference from one food-plant to another during the breeding season, the species has not developed into biological races, and an individual that has started development on one food-plant can readily continue it on another. The quiescent period is not connected with either aestivation or hibernation, but is merely a rest between the breeding seasons, influenced only by the time of year at which the seeds on the different plants are available.

Infestation is only recognised when the seed is cut open, and is found to contain a discoloured and somewhat shrivelled embryo. The direct loss in weight to the seed is estimated at at least 2·5 per cent. under normal conditions; seed of a delayed second picking may have lost as much as 15 per cent. or more of its weight. The annual loss from this cause alone is estimated at about £100,000. The extent of non-germination of cotton seed attacked is discussed in detail;

in severe cases three-fourths of the seed may be infertile. The seed of *H. esculentus* is similarly affected. Possible damage to the lint is of secondary importance. Staining only occurs if cotton is ginned very soon after picking, and there are still living bugs present. If the seed-cotton is left 10 days after being picked, all the bugs will be dead and dried up and no staining can result. The bug does not cause shedding of buds or young bolls.

Neither parasites nor predators have been observed, weather conditions being probably the only natural check. The obvious remedy is the elimination of the winter quarters, which entails chiefly destruction of weeds on the banks of irrigation channels. Bugs could also be brushed off the trunks of trees and other places where they collect on cold mornings, and stamped into the ground. Traps made of pieces of sack-cloth tied on stakes and put round the edge of a cotton field will collect large numbers of bugs, but the number of such traps necessary for a large field is a disadvantage. Hand-picking, traps of cotton seed in early summer, trap-crops of *H. esculentus* or *H. cannabinus* and the removal of all totally damaged bolls at the time of first picking are all considered either useless or impracticable. Damage to the seed can be lessened by early picking, and it might be profitable to make three pickings instead of the usual two. Damage to the lint can be entirely eliminated by spreading cotton in the sun, the use of loose-meshed sacks to enable as many as possible of the bugs to escape, and the postponement of ginning for about 10 days after picking, so that none of the few bugs still left may be alive and cause any staining by being crushed.

GILL (J. B.). **Important Pecan Insects and their Control.**— *U.S. Dept. Agric.*, Farmers' Bull. 1364, 48 pp., 61 figs. Washington, D.C., January 1924.

This is a revision of a bulletin previously noticed [*R.A.E.*, A, vi, 226]. In addition to the pests already mentioned *Nezara viridula*, L. (southern green stink bug), is recorded as producing the pecan kernel spot formerly believed to be due to a fungous disease [*R.A.E.*, A, xii, 1]. Cover crops that favour it should be avoided, velvet beans being recommended as a summer cover crop in bearing pecan orchards. Infestation by scale-insects is very limited, and only in a few restricted localities has *Chrysomphalus obscurus*, Comst. (obscure scale) become sufficiently injurious to warrant the use of artificial control measures. In this connection oil sprays applied in the dormant season proved more effective than concentrated lime-sulphur solution at the usual dormant strength.

COVILLE (P.). **A few Hypotheses on White Pine Losses from Weevil Damage.**— *Ames Forester*, xi, pp. 72–80, 4 figs. Ames, Iowa, 1923. [Received 21st May 1924.]

The author has collected in this paper data on the loss of height growth for various densities of stand of white pine (*Pinus strobus*) infested with the white pine weevil, *Pissodes strobi*, together with percentages of injury, etc. The facts are presented in the form of tables and graphs. It is shown that where weevil damage is very prevalent, it seems to occur irrespective of density or spacing of trees. It was noticed that the trees on which the tests were made were growing

abnormally fast the year before weevil injury, and had either recovered dominancy or were well on the way to do so within a year afterwards ; it is therefore naturally dominant trees that are attacked. While the greatest loss from weevil damage is in the market value of the lumber (which shows crooked trunks after injury), this study has shown that another factor is loss in marketable length. Other direct weevil damage is loss of vitality in younger trees, stunting of trees that would normally have been expected to produce the best stands, and reduction in final height growth.

HEADLEE (T. J.). **Report of the Department of Entomology.**— *Ann. Rept. New Jersey Agric. Expt. Sta., 1921-22,* pp. 409–474, 8 pls. New Brunswick, N.J., 1923. [Received 21st May 1924.]

A list is given of the insects recorded in New Jersey during the year, with the locality and date of their occurrence.

The codling moth, *Cydia* (*Carpocapsa*) *pomonella*, L., was as abundant as usual in the southern half of the State, and only in orchards in in which a coating of poison was maintained on the fruit and foliage during the period of entry by the larvae of the 1st and 2nd generations was satisfactory control achieved. In one locality, experiments were made in the use of spreaders and adhesives to maintain the coat of poison. With 6 sprayings instead of 11, and the addition of calcium caseinate at the rate of 1½ lb. to 100 U.S. gals. of spray, an equally good coating was maintained. In the northern part of the State the insect is much less abundant and comparatively easy to control. Plum curculio (*Conotrachelus nenuphar*, Hbst.) has been rather less troublesome than last year [*R.A.E.*, A, x, 610], and has been controlled on apples by the coating of poison on fruit and foliage during the one-month period following the dropping of the bloom. Aphids, particularly the rosy (*Aphis sorbi*, Kalt.) and green (*A. pomi*, De G.) varieties were generally troublesome on apples throughout the State. Where the trees were thoroughly coated at the green bud stage with a mixture of 40 per cent. nicotine sulphate and commercial lime-sulphur, they were kept well in check. The oat aphis (*Siphonaphis padi*, L.), which is an earlier species, is not so serious a pest and is readily killed with any of the common dormant contact sprays, or even winter strength commercial lime-sulphur. The pear psylla (*Psylla pyricola*, Forst.) was very injurious to the pear crop, but the oriental peach moth, *Cydia* (*Laspeyresia*) *molesta*, Busck, was much less abundant than last year and did very little damage. The rose chafer (*Macrodactylus subspinosus*, F.) has been largely controlled by self-boiled lime-sulphur treatment ; roses, however, should be covered with mosquito netting during the period when the beetles are numerous, as the sulphur whitens the foliage and discolours the bloom. The Angoumois grain moth (*Sitotroga cerealella*, Oliv.) was very injurious to the wheat stored after the 1921 harvest. After threshing, thorough treatment of grain in bins with 1 lb. carbon bisulphide per 100 bushels of grain practically exterminated the insects. White grubs (*Lachnosterna*) were very troublesome on golf greens and lawns, and wireworms were very prevalent in areas under intense cultivation, such as market gardeners' plots, perhaps owing to the presence of weeds and grasses ; satisfactory control of these has not been discovered. The fall canker worm [*Alsophila pometaria*, Harr.] defoliated many forest trees in the northern part of the State.

The Japanese beetle (*Popillia japonica*, Newm.) continues to spread at the rate of 5 to 10 miles a year; methods of control by artificial means and by natural parasites are still being worked out. The area infested by gipsy moth (*Porthetria dispar*, L.) has much decreased after one year's work against it. Experiments are described showing the efficacy of mixing Milltown ball clay no. 9 with beans to prevent infestation with *Bruchus obtectus*, Say (bean weevil) [*R.A.E.*, A, xii, 315]. In the tests described, the containers were connected with a constantly passing air stream conditioned to 80° F. and 73·4 per cent. atmospheric moisture. The clay was not found to reduce existing infestations of *S. cerealella*, but would prevent infestation of wheat or shelled maize. Hickory billets that had been stored for a year were found to be infested with the powder post beetle (*Lyctus* sp.) chiefly in the larval stage. The billets were treated in kilns that contained 15,000 billets at a time. The kilns were heated to 140° F. in the course of 12 hours; this temperature was maintained for another 12 hours, and then allowed to fall for the next 12 hours. This seemed entirely satisfactory. Experiments on a smaller scale indicated that a temperature of about 130° F. for 2 hours would kill the larvae of the beetle.

Rudolfs (W.). **A Study of Dust Carriers for Nicotine.**— *Ann. Rept. New Jersey Agric. Expt. Sta. 1921–22*, pp. 445–449. New Brunswick, N.J., 1923.

Experiments with dust carriers [*cf. R.A.E.*, A, xii, 31] for the purpose of improving nicotine delivery indicate that dolomite is the best for the purpose, as it is cheap and easy to purchase, convenient to handle and grind, very adhesive without having scorching properties, and can be used with both nicotine sulphate and free nicotine mixtures.

Beckwith (C. S.). **Investigations of Cranberry Problems.**— *Ann. Rept. New Jersey Agric. Expt. Sta. 1921–22*, pp. 449–465. New Brunswick, N.J., 1923.

Improvements in spraying machinery for use on cranberry bogs are discussed. Considerable injury is caused on the bogs by grasshoppers, and a report on them by H. B. Scammell is given. The principal species are the long-horned forms, *Orchelimum concinnum*, Scudd., and *O. glaberrimum*, Burm., and the short-horned forms, *Schistocerca alutacea*, Harr., and *Melanoplus femoratus*, Burm. The long-horned are the more injurious, and eggs of one of them were found in the crown of deer grass (*Panicum dichotomum*) growing on the bog; the eggs were in good condition although the bog had been winter-flooded, showing that infestation may come each year, not only from the uplands, but from the bog itself. The hatching of these long-horned forms occurs throughout June and into July, so that early June flooding clears off only a small proportion of them. Broadcasting air-slaked lime over the plants was tried with little success, and spreading poison bait seemed to have no effect in reducing the numbers. Autumn flooding of the bogs seems to be distinctly beneficial, as it prevents egg deposition which, in the season under observation, had begun on 4th October.

Following the lines of previous workers on *Crambus hortuellus*, Hb. (cranberry girdler) [*R.A.E.*, A, vi, 10, etc.], the author tried various

times and depths of flooding while the crop was on the plants. It was found that the damage to the crop was less if the bog was flooded shallowly rather than deeply, was much less when the flooding was done on clear days than on cloudy, and increased with the length of flooding. Preliminary work showed that three days' flooding would kill the larvae. Flooding during early August is very desirable as it prevents much of the year's feeding by the larvae, but the danger of rotting the crop is great.

FANT (G. W.), MOORE (W. D.) & PETERSON (A.). **Response of Germinating Corn and White Grubs to Paradichlorobenzene and similar Chemicals.**— *Ann. Rept. New Jersey Agric. Expt. Sta. 1921–22.* pp. 465–473, 8 pls. New Brunswick, N.J., 1923.

The author's conclusions are as follows :—The gases, sodium cyanide, sodium sulpho-carbonate, carbon tetrachloride, carbon bisulphide, benzaldehyde, furfural, toluene, nitrotoluene, orthonitrophenol, naphthalene, benzene, nitrobenzene, orthonitrochlorobenzene, paranitrochlorobenzene, ortho-paradichlorobenzene and paradichlorobenzene have some effect on germinating maize. Sodium cyanide, ortho-paradichlorobenzene and paradichlorobenzene produced the greatest, while sodium sulpho-carbonate, carbon tetrachloride, carbon bisulphide and naphthalene seemed to have the least effect. The experiments with paradichlorobenzene and germinating maize brought forth the conclusion that the distribution of the crystals of paradichlorobenzene is important. Where the crystals are heaped together they evaporate slowly, and the concentration of the gas about the mass is not as extensive as when the crystals are separated by placing them in a 14-inch circle, where the evaporation is more rapid. The result is a greater distribution of the gas, and this in turn kills plants and insects over a greater distance. The experiments with paradichlorobenzene show that there is a certain definite zone of gas concentration where the plants are not killed but are retarded or stunted in their growth. The injury produced on germinating maize by paradichlorobenzene is that the roots and taps are stunted or killed when close to the chemical. Furthermore, if the paradichlorobenzene is present when the seed germinates, the diameter of the tap and lateral roots is considerably increased. Apparently the enlarged portion of the root does not function properly, death of the area ensues, and usually a watery decay is produced by saprophytic fungi. Maize plants grown in liquid nutrient media in the presence of small amounts of liquid orthodichlorobenzene and crystalline paradichlorobenzene are killed. The injuries obtained from the various chemicals employed are summarised in a table. A few experiments with white grubs [*Lachnosterna*] also show the bearing distribution of the crystals of paradichlorobenzene has on the killing effect produced. In the experiments with the white grubs, one test indicates that the gas is heavier than air; at least more grubs were killed at a definite distance below a given amount of paradichlorobenzene than at the same distance above it.

HORSFALL (J. L.). **Life History Studies of *Myzus persicae* Sulzer.**— *Pennsylvania Agric. Expt. Sta.*, Bull. 185, 16 pp., 2 figs. State College, Pa., February 1924.

Myzus persicae, Sulz. (green peach aphis) attacks a greater variety of plants than any other Aphid in Pennsylvania. It is particularly

destructive to cruciferous crops, such as seedling late cabbage and turnips, during late summer. Owing to the scattered information concerning its life-history and habits, these data have been gathered together with additional observations under local conditions. A long list of food-plants is given, the seasonal infestation of those of economic importance being indicated.

HORSFALL (J. L.). **The Control of Plant Lice on Vegetables.**—*Pennsylvania Agric. Expt. Sta.*, Bull. 186, 16 pp., 5 figs. State College, Pa., March 1924.

Myzus persicae, Sulz. (spinach aphis) and *Aphis pseudobrassicae*, Davis (false cabbage aphis) are serious pests of cruciferous crops in Pennsylvania, but may easily be controlled by the application of nicotine sprays or dusts. Spraying is cheaper, the formula recommended being 1½ U.S. pts. 40 per cent. nicotine sulphate (black leaf 40), 5 lb. laundry soap and 100 U.S. gals. water. At least this amount should be applied per acre, the first application being made immediately after a migration of winged forms has taken place. The lower sides of the leaves should be examined frequently. In a normal season one or two applications should be sufficient. A pressure of at least 200 lb. should be employed, the spray being directed to the undersides of the leaves.

In dusting the best results were obtained with free nicotine dust containing 1·25 per cent. actual nicotine and nicotine sulphate dust containing 2 per cent. actual nicotine. The following formulae are recommended : 95 lb. superfine hydrated lime to 5 lb. nicotine sulphate ; or 50 lb. superfine hydrated lime, 45 lb. dolomite and 5 lb. nicotine sulphate. The construction of a home-made dust-mixer is described. The amount of dust applied per acre varies between 30 and 60 lb. according to the size of the plants, nicotine content of the dust and weather conditions.

Entomology.—*Ann. Repts. Iowa Agric. Expt. Sta., 1918–19 to 1921–22*, pp. 27–30, 39–42, 40–43 and 39–43. Ames, Iowa [1920–23]. [Received 26th May 1924.]

The problems dealt with in these reports include studies on the potato leaf hopper, *Empoasca mali*, Le B., and its control, and its relation to tipburn. Most of the information has been noticed from time to time in this *Review*, the suggestions for Iowa conditions being the planting of a resistant variety rather late so as to avoid injury by the spring flight of leafhoppers, and spraying at least three times with 4–6–50 self-prepared Bordeaux, or a good brand of dry Bordeaux powder mixed with some adhesive.

Among other pests recorded, armyworms were particularly injurious during 1920 to oats by cutting off the spikelets. During 1921 many acres of red clover were killed by the clover leaf weevil [*Hypera punctata*, F.] and bristly cutworm [*Polia renigera*, Steph.] in the southern and central parts of the State.

During 1922 Aphids were particularly abundant, *Siphonaphis padi*, L. (*Siphocoryne avenae*, F.) (apple bud aphis) appearing in sufficient numbers in April to injure the apple buds to a serious extent. *Blissus leucopterus*, Say (chinch bug) appears to be increasing in many localities. Serious damage was caused by grasshoppers, *Melanoplus*

bivittatus, Scud., and *M. differentialis*, Thos., being the predominating species. *Papaipema nitela*, Gn.(stalk borer) was unusually abundant, but did not cause any very serious injury. Owing to damage by *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly), a number of fields of wheat had to be ploughed under.

LOVETT (A. L.) & FULTON (B. B.). **Fruit Grower's Handbook of Apple and Pear Insects.**—*Oregon Agric. Expt. Sta.*, Station Circ. 22, 72 pp., 45 figs. Corvallis, Oregon, April 1920, Revised 1922.

The previous edition of this useful handbook has already been noticed [*R.A.E.*, A, ix, 15].

PARROTT (P. J.). **The Utility of Dust and Spray Mixtures for Orchard Treatment.**—*Proc. State Hortic. Assoc. Pennsylvania 1924*, pp. 8–23. Harrisburg, Pa., 1924.

The information contained in this paper is substantially the same as one already noticed [*R.A.E.*, A, xii, 277].

HARTZELL (F. Z.). **The Rose Chafer.**—*New York Agric. Expt. Sta.*, Circ. 74, 4 pp., 2 pls. Geneva, N.Y., 1st March 1924.

An account is given of the various stages and life-history of the rose chafer [*Macrodactylus subspinosus*, F.]. The recommendations for its control are the destruction of the larvae, cultivation to kill the pupae, and spraying against the adults. Sprays should be applied as soon as the beetles appear, using 5 lb. lead arsenate (dry), 2 U.S. gals. molasses (or 25 lb. glucose) and 100 U.S. gals. of water, on grapes. The same formula may be used on cherries with glucose instead of molasses. Where necessary, a second application should be made four to seven days after the first; the spray will also have to be repeated should it rain within 24 hours after spraying.

GLASGOW (H.). **The Cabbage Maggot: Its Control in the Seedbed.**—*New York Agric. Expt. Sta.*, Circ. 76, 4 pp., 2 pls. Geneva, N.Y., 15th March 1924.

Cheesecloth screens, treatment with mercury bichloride, and tobacco dust applications are the three dependable methods for protecting cabbage seedbeds against the cabbage maggot [*Phorbia brassicae*, Bch.]. All three methods are described [*cf. R.A.E.*, A, xi, 224; xii, 174, etc.].

UNDERHILL (G. W.). **The Squash Lady-bird Beetle.**—*Virginia Agric. Expt. Sta.*, Bull. 232, 24 pp., 7 figs. Blacksburg, Va., July 1923. [Received 26th May 1924.]

Epilachna borealis (melon beetle) is the most important pest attacking water melons in Virginia; both the adults and larvae feed on the vines, the latter causing more damage. Late in the season the beetles may feed on various plants, but the larvae confine their attacks to cucurbits. Descriptions are given of the various stages. Under Virginia conditions the winter is passed by the adults chiefly on the trunks of trees and to a less extent under leaves and rubbish on the ground. They emerge about the 20th May, and the first eggs are laid about the second week in June; they hatch in 7 or 8 days. The larvae feed on the lower

surface of the leaves for 16–20 days, the pupal stage lasting about a week. The first adults of the new generation appear about the middle of July, and begin egg-laying about a fortnight later. The larvae from these eggs emerge in late July, and develop into beetles about the middle of August. During this month beetles of the current year's generation, as well as the overwintering adults of the previous year, may be found together, the generations overlapping considerably. Beetles of both generations go into hibernation about September.

In comparative tests made with zinc arsenite, and calcium, magnesium and lead arsenates, the first two gave decidedly the best results. All poisons had a more or less repellent action. The larvae are more susceptible than the beetles, and of these the newly emerged adults are more easily killed than those that have hibernated. Both zinc arsenite and calcium arsenate may be safely applied to melon foliage at the rate of 2 or 3 lb. (powder) to 50 U.S. gals. of spray, with the addition of 3 lb. of stone (or 4 lb. of hydrated) lime. Any arsenical used should contain less than 1 per cent. of water-soluble arsenious oxide (guaranteed). The lower surface of the foliage must be thoroughly coated to give effective results. Considerable reduction in injury may be obtained by applying the first spray when the beetles begin to enter the fields in the spring, followed by another application in about ten days. Against the larvae a third application should be made in mid or late July, and it is advisable to apply a fourth spray about the middle of August.

Other methods of reducing infestation are crop rotation, the use of trap crops, handpicking of the beetles, the development of early maturing varieties of melons, the prompt destruction of melon vines and food-plants except trap-crops immediately after the second cutting of melons in order to force the beetles to feed on the trap crops, and the destruction of overwintering adults.

E. borealis appears to be particularly free from natural enemies, the only ones observed by the author being *Podisus maculiventris* (spined soldier bug), *Perillus circumcinctus* (soldier bug) and the Reduviid, *Ampoimerus crassipes*, all of which are predacious on the adults, pupae and larvae.

Modification of Pink Bollworm Quarantine. Amendment No. 2 to Second Revision of Regulations Supplemental to Notice of Quarantine No. 52.—*U.S. Dept. Agric. Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 17th January 1924.

These regulations regarding the interstate movement of cotton and cotton products directed against the pink bollworm [*Platyedra gossypiella*, Saund.] and effective as from 17th January, 1924, are a revision of previous ones [*R.A.E.*, A, xii, 30].

Amendment to General Regulations under the Destructive Insect and Pest Act.—*Canada Gaz.*, pp. 3875–3876. Ottawa, 19th April 1924.

Various alterations are made to certain of the Regulations published 7th July, 1923 [*R.A.E.*, A, xi, 475].

Ross (W. A.). **Rose Chafer : A serious Fruit Pest.**—*Canadian Hortic.*; Fruit Edn., xlvii, no. 5, p. 129, 2 figs. Peterboro, Ont., May 1924.

Though spraying is recommended against the rose chafer [*Macrodactylus subspinosus*, F.] [*R.A.E.*, A, xi, 185], special stress is laid on the importance of cultivation, as in all the districts surveyed this beetle was most abundant in sandy ground, waste land, etc. All such land should be reclaimed and planted with lucerne or sweet clover, or where it is unsuitable for agricultural purposes, reforestation is recommended, as this will in time make the land unsuitable as a breeding place for this pest.

Ehrhorn (E. M.). **Report of Chief Plant Inspector, October-December 1923.**—*Hawaiian Forester & Agric.*, xxi, no. 1, pp. 29–31. Honolulu, January–March 1924.

The pests intercepted during the three months were : from California, *Pseudococcus maritimus* on pears and *P. citrophilus* on geraniums ; from China, a Scolytid in package of paddy rice ; from New South Wales, an undetermined mealybug on Cycad seed ; from Samoa, an undetermined mealybug on *Pandanus* seed and Scarabaeid larvae amongst bread-fruit cuttings ; and from the Philippines, *Calandra oryzae* in cleaned rice and rice starch.

Lovett (A. L.). **The Cherry Fruit-fly.**—*Oregon Agric. Expt. Sta.*, Station Circ. 35, 3 pp., 3 figs. Corvallis, Oregon, April 1923. [Received 26th May 1924.]

This information about the cherry fruit-fly [*Rhagoletis cingulata*, Lw.] has already been noticed [*R.A.E.*, A, xi, 428].

Lovett (A. L.). **The Hop Red Spider.**—*Oregon Agric. Expt. Sta.*, Station Circ. 36, 3 pp., 1 fig. Corvallis, Oregon, April 1923. [Received 26th May 1924.]

In seasons of drought and high temperatures the red spider-mite [*Tetranychus telarius*, L.] may develop into an important pest on hops, causing serious injury to the foliage. The mites collect on the lower surface of the leaves and spin fine webs, ovipositing in the web. Reproduction is continuous throughout the summer. Various sulphur sprays are recommended. Stripping the lower leaves, when infested, will often delay serious infestation of the main vine, and the destruction of vegetation about the field by burning, ploughing, or the use of weed killer or crude oil during late winter or spring will do much to keep down red spider.

Lovett (A. L.). **The Onion Maggot.**—*Oregon Agric. Expt. Sta.*, Station Circ. 37, 3 pp. Corvallis, Oregon, April 1923. [Received 26th May 1924.]

An account is given of the onion maggot [*Hylemyia antiqua*] and of the measures against it [*R.A.E.*, A, x, 577 ; xi, 67, 478]. Onion thrips [*Thrips tabaci*] is sometimes troublesome, especially where good cultivation is not maintained ; nicotine dust or kerosene emulsion are recommended against it.

LOVETT (A. L.). **The Peach and Prune Twig-miner.**—*Oregon Agric. Expt. Sta.*, Station Circ. 38, 3 pp., 3 figs. Corvallis, Oregon, April 1923. [Received 26th May 1924.]

This information regarding the peach and prune twig-miner [*Anarsia lineatella*, Zell.] and methods for its control is substantially the same as that previously noticed [*R.A.E.*, A, xi, 284].

LOVETT (A. L.). **Tree Borers and their Control.**—*Oregon Agric. Expt. Sta.*, Station Circ. 39, 7 pp., 4 figs. Corvallis, Oregon, April 1923. [Received 26th May 1924.]

A general account is given of the life-history, habits and measures of control against flat-headed borers [Buprestids], shot-hole borers [Scolytids] and the bronze apple-tree weevil or dead-bark beetle [*Magdalis aenescens*], all of which are common in Oregon, but only injure wounded or unhealthy trees.

LOVETT (A. L.) & BARSS (H. P.). **Insect Pests and Diseases of Currants and Gooseberries.**—*Oregon Agric. Expt. Sta.*, Station Circ. 42, 12 pp., 5 figs. Corvallis, Oregon, June 1923. [Received 26th May 1924.]

The chief pests dealt with are *Epochra canadensis*, Lw. (currant and gooseberry maggot), *Myzus ribis*, L. (currant aphis), sawflies, *Aegeria* (*Sesia*) *tipuliformis*, Clerck, (currant cane borer), *Chrysobothris mali*, Horn, and *Dicerca pectorosa*, Lec. (flat-headed borers), attacking both currants and gooseberries, and *Xylocrius cribratus*, Lax. (black gooseberry borer). A warning (dated January 1924) is issued that berries intended for canning should not be sprayed with lime-sulphur after the fruit is set, or serious loss may arise from gas forming in the cans. Sulphur dusts may possibly cause the same trouble.

LOVETT (A. L.) & BARSS (H. P.). **Insect Pests and Diseases of Bramble Fruits.**—*Oregon Agric. Expt. Sta.*, Station Circ. 45, 16 pp., 7 figs. Corvallis, Oregon, June 1923. [Received 26th May 1924.]

The chief pests dealt with are *Pennisetia* (*Bembecia*) *marginata*, Harr. (loganberry crown-borer), *Phorbia rubivora*, Coq. (cane maggot), and *Monophadnus rubi*, Harr. (raspberry sawfly). They all attack raspberries, loganberries and blackberries, though blackberries are seldom materially injured by *M. rubi*.

MOTE (D. C.). **Control of the Western Peach and Prune Root-borer.**—*Oregon Agric. Expt. Sta.*, Station Circ. 50, 4 pp., 3 figs. Corvallis, Oregon, August 1923. [Received 26th May 1924.]

This information regarding the western peach and prune root borer [*Aegeria opalescens*, Edw.] has been previously noticed [*R.A.E.*, A, ix, 163; xi, 13].

SNODGRASS (R. E.). U.S. Bureau Ent. **The Fall Webworm.**—*Ann. Rept. Smithsonian Instn. 1921*, pp. 395–414, 2 pls., 12 figs. Washington, D.C., 1923. [Received 29th May 1924.]

This is a popular account of the life-history of *Hyphantria cunea* (fall webworm) in the United States.

Reinhard (H. J.). **The Sweet Potato Weevil.**—*Texas Agric. Expt. Sta.*, Bull. 308, 90 pp., 5 figs. College Station, Tex., April 1923. [Received 29th May 1924.]

Cylas formicarius, F. (sweet potato weevil) is of great economic importance to the sweet potato industry of the southern United States. The studies recorded in this bulletin were undertaken from January 1918 to April 1920, and are summarised by the author as follows :—

The sweet potato weevil, *Cylas formicarius*, is an imported pest. It is the most destructive insect enemy of sweet potatoes in Texas, and is widely distributed within the State. The climatic conditions of the Gulf region are especially favourable for its development. All varieties of sweet potatoes grown in Texas are attacked by the weevil, and the annual loss resulting from the ravages of this pest is very great.

The average life-cycle comprises 35 to 40 days under favourable conditions. More than 500 eggs may be deposited by the female weevil, although the average number is considerably less. The length of adult life is often protracted, and may extend upwards of 300 days. In stored tubers feeding and breeding may be continued throughout the year. Under laboratory conditions eight generations of weevils were obtained in a year. The sweet potato weevil does not enter into a definite period of hibernation at College Station.

No parasites or predacious enemies were observed that are of economic importance. Crop rotation and clean culture are important features in control. Remedial measures consist of spraying with arsenicals ; the use of weevil free plants for propagation ; prompt and thorough harvesting ; fumigation with carbon bisulphide ; and proper storage.

Yothers (W. W.) & Mason (A. C.). **The Camphor Thrips.**—*U.S. Dept. Agric.*, Dept. Bull. 1225, 29 pp., 6 pls., 7 figs. Washington, D.C., 30th April 1924.

Injury by *Cryptothrips floridensis*, Wats. (camphor thrips) appears to be almost entirely confined to pruned trees or those that have been previously injured. On such trees the thrips collect in large numbers around the cut ends and feed on the plant tissues. They also destroy the buds and the new growth and even work on the limbs on which they cause cracking of the bark. Uncut trees, though possibly harbouring a small number of thrips, do not appear to suffer from their presence. The original description of the adult is quoted, the other stages being also described.

The life-history has been studied in the laboratory under conditions as nearly natural as possible. The life-cycle varies considerably according to the season of the year, the average period of development from egg to egg in the summer being 21·85, and in the winter 45·7 days, thus allowing for a maximum of 12 generations in the year. The eggs are usually deposited in cracks or lesions of the bark, though they may also be placed in the leaf axils or on leaf scars and along the bud scales. They have also been found along the upper ends of the cut limb. The larvae are found in cracks and lesions on the bark, and on the buds and new terminal growth. Pupation occurs in the bark lesions. All parts of the tree are subject to attack except the roots, the greatest damage probably resulting from the injury to the buds, on which both the larvae and adults feed. Injury similar in effect is caused by the Curculionid, *Heilipus apiatus*, Oliv.

In the warmer parts of Florida, *C. floridensis* is active throughout the year, but in the more northern portions reproduction probably ceases during the winter. In these localities the adults hibernate in the bark lesions, in which they shelter in cloudy and rainy weather even in the summer. The camphor tree (*Cinnamomum camphora*) is apparently the only food-plant.

The natural enemies include Coccinellids, the lacewing fly, *Chrysopa oculata*, F., and possibly a predacious bug, *Anthocoris* sp., and a Hymenopterous parasite, *Tetrastichus* sp. Spraying is only effective if applied when the thrips are on the foliage in bright days, when all those hit may be killed by a solution of ½ lb. 40 per cent. nicotine sulphate, 2 U.S. qts. potash fish-oil soap and 2 U.S. qts. lime-sulphur to 50 U.S. gals. of water. The most practical method of control is a changed system of pruning the trees. Most of the damage may be eliminated by cutting the trees off at the surface of the ground rather than by cutting away part of the limbs. By this means all hibernating places as well as the food supply are removed. The trees subsequently sprout from the crown, and the new growth remains free from infestation for several months. After cutting back hedges, some material such as shellac should be applied to the cut edges to prevent dying back or oviposition on them. Nursery stock may be fumigated with sodium cyanide at the rate of 1 oz. to 100 cu. ft. with an exposure of 1 hour.

GODFREY (G. H.) & MCKAY (M. B.). **The Stem Nematode *Tylenchus dipsaci* on Wild Hosts in the Northwest.**— *U.S. Dept. Agric.*, Dept. Bull. 1229, 9 pp., 3 pls., 1 fig. Washington, D.C., 1st March 1924.

The occurrence of *Tylenchus dipsaci*, Kühn, on the wild strawberry (*Fragaria chiloensis*) and the false dandelion (*Hypochaeris radicata*) are described. The effect of infestation on these plants is similar to that on cultivated ones. The wild strawberry strain occurs along the west coast of Oregon near the seashore and may infest various species of *Fragaria*, as well as being transmissible to red clover. The strain found in the false dandelion occurs almost universally in western Oregon, but all attempts to transmit it to other food-plants have failed. It is possible that local infestation of cultivated strawberries may be due to the presence of the Nematode in neighbouring wild plants, and investigations on these lines are now being made.

WARBURTON (C.). **Annual Report for 1923 of the Zoologist.**— *Jl. R. Agric. Soc. England*, lxxxiv, pp. 362–371, 5 figs. London, 1923. [Received 28th May 1924.]

During 1923 Aphids were particularly abundant, almost all crops suffering more than usual from their attack.

In view of recent additions to the knowledge of the life-history of various pests, a revised version of the general account of the pests of cereal crops, which appeared in the annual report of the Zoologist for 1900, is here given. This includes a key to the principal pests of these crops, and notes on the life-history and habits, as well as recommendations for control, of the following species: *Mayetiola destructor* (Hessian fly), *Chlorops taeniopus* (gout fly), *Oscinella frit* (frit fly), *Hylemyia* (*Leptohylemyia*) *coarctata* (wheat-bulb fly), *Contarinia* (*Cecidomyia*) *tritici* (wheat midge), *Cephus pygmaeus* (wheat sawfly) and *Tylenchus dipsaci* (*devastatrix*) (stem eelworm).

Green (E. E.) & Laing (F.). **Descriptions of some Apparently New Non-Diaspidine Coccidae.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 415–419, 6 figs. London, May 1924.

The following new species are described: *Stictococcus anonae* on fruit of *Anona muricata* from Tanganyika Territory; *Pseudococcus vitiensis* on coconut leaf from Fiji; *Phenacoccus grenadensis* on egg plant and *Aster* sp. from Grenada; *Ceronema grandis* on an undetermined native plant from Kenya Colony; *Lecanium jaculator* on leaves of *Montrichardia aculeata* from British Guiana; and *L.* (*Akermes*) *colae* on *Cola acuminata* from the Gold Coast.

Bagnall (R. S.). **On a New Injurious Thrips affecting Tea in India.**—*Bull. Ent. Res.*, xiv, pt. 4, p. 455. London, May 1924.

Dendrothrips bispinosus, sp. n., is recorded as badly damaging tea on an estate in the Nilgiri Hills, South India.

Muir (F.). **On a New Cixiid attacking Coconut Palms (Homopt.).**—*Bull. Ent. Res.*, xiv, pt. 4, p. 456, 1 fig. London, May 1924.

Euryphlepsia cocos, sp. n., is described from the Solomon Islands, but the extent of injury caused by it to coconut palms is not known.

Ishikawa (T.). *Chilo simplex* **in Niigata Prefecture.**—*Niigata Agric. Expt. Sta.*, Special Rept. no. 15, pp. 1–240. Nagaoka, 1922.

Chilo simplex causes considerable damage to the rice crop in Niigata every year. There are two generations annually, hibernation taking place in the larval stage in the stem of the rice plant. The adults of the first brood emerge from the middle of May to the middle of July, and those of the second from the end of July to the beginning of September. The males outnumber the females. The adults live about 3–8 days. Each female deposits 3–5 clusters of eggs upon the upper surface of the leaves about 2 days after emergence, and is capable of depositing 400. About 28 per cent. of the eggs are parasitised by Hymenopterous parasites. The egg stage lasts 8 or 9 days, and the larval stage occupies 45–50 days in summer and 270–279 days for the overwintering larvae. No conclusions have been drawn from various remedial measures that have been tried.

Sonan (J.). **Insect Pests of the Tea Plant in Formosa.**—*Taiwan-nojiho* [*Review of Formosan Agric.*], no. 194, pp. 41–51. Taihoku, January 1923. [In Japanese.]

Of the 77 species at present known to attack tea in Formosa, the following are the most important: *Odontotermes formosanus*, Shiraki, *Brachytrypes portentosus*, Licht., *Empoasca* (*Chlorita*) *flavescens*, F., *Homona menciana*, Wlk., *Adoxophyes privatana*, Wlk., *Biston marginata*, Mats., *Andraca bipunctata*, Wlk., *Clania variegata*, Snell., *Euproctis conspersa*, Butl., *Aeolesthes induta*, Newm., *Tetranychus* sp. and *Helopeltis* sp. [*cf. R.A.E.*, A, ix, 77].

Takeuchi (K.). **On the Tenthredinoidea of Formosa.**—*Trans. Nat. Hist. Soc. Formosa*, xiii, pp. 39–46. Formosa, September 1923.

A list is given of the sawflies of Formosa, 62 species being enumerated.

NIIJIMA (Y.) & KINOSHITA (F.). **Die Untersuchungen ueber japanische Melolonthiden. II.**—*Res. Bull. Coll. Expt. Forests, Coll. Agric., Hokkaido Imp. Univ.*, ii, no. 2, pp. 1–253, 7 pls. Sapporo, 1923. [In Japanese.]

This is a monograph of the MELOLONTHIDAE of Sakhalin, Japan, Korea and Formosa. At present about 260 species are known to occur in the Japanese Empire. Of these, 28 are new to science, the descriptions of them being in German.

YAGI (S.). **On the Classification of the Wild Silk-producing Insects in Japan. I.**—*Rept. Alumni Assoc. Ueda Sericultural Coll.*, xi, pp. 1–24. Ueda, 1924.

At present 13 species of Saturniids are known to occur in Japan. All the larvae are described and illustrated, and keys are given for the identification of the subfamilies, genera and species.

KUWANA (I.). **On the Coccidae of Japan.**—*Insect World*, xxviii, pp. 3–4, 39–43, 110–113. Gifu, 1924. [In Japanese.]

Keys are given to the subfamilies, genera and species of the Japanese Coccids, the generic characters being briefly mentioned.

TANAKA (K.). **On the Life-history of** *Caligula japonica*, **Moore.**—*Insect World*, xxviii, pp. 5–7, 44–51, 61–92 & 125–126. Gifu, 1924. [In Japanese.]

Caligula japonica, Moore, has one generation a year, and hibernation occurs in the egg stage. The eggs hatch at the end of April, and the larvae eat the leaves of *Rhus javanica*, *Castanea sativa*, *Prunus* spp., *Cinnamomum camphora*, etc. This stage lasts 70–80 days during which period 7, or sometimes 5 or 6, moults take place. The pupal stage lasts about 80 days. The moths appear at the beginning of October and pair soon after emergence. The length of life is less than 7 days. The young larvae resemble the excreta of birds and are often killed by ants. Fishing lines are manufactured from the contents of the silk-glands of the mature larvae.

UYE (T.). **On Three Aphids in Kiushyu.**—*Insect World*, xxviii, pp. 14–15, 92–92 and 126–127. Gifu, 1924. [In Japanese.]

Astegopteryx kashifolia, sp. n., is described from *Quercus acuta*, *Oregma quanici*, sp. n., from *Arundinaria simoni*, and *O. lanigera*, Zehnt., from *Miscanthus*.

MOTOJI (M.). **Breeding Records of** *Ptychanatis axyridis*, **Pall.**—*Insect World*, xxviii, pp. 95–96. Gifu, 1924. [In Japanese.]

Notes are given of the breeding under artificial conditions of the aphidivorous Coccinellid, *Ptychanatis axyridis*, Pall.

KATSUMATA (Y.). **On the Preparation of Coccid Specimens.**—*Insect World*, xxviii, pp. 113–124. Gifu, 1924. [In Japanese.]

The methods of preparing Coccid specimens are given in detail.

Paillot (A.). **Sur** *Perezia pieris*, **Microsporidie nouvelle parasite de** *Pieris brassicae* **L.**—*C.R. Soc. Biol.*, xc, no. 16, pp. 1255–1257, 1 fig. Paris, 16th May 1924.

Perezia pieris, sp. n., was found in the malpighian tubes, the silk glands and the wall of the digestive tract of the larvae of *Pieris brassicae* in the vicinity of Lyons. Under laboratory conditions larvae were infected by feeding them on leaves contaminated with the body fluid of infected pupae. The larvae thus infected pupated during the first fortnight of January and were still alive on the 24th April.

Blattný (C.). **Mšice na jaře.** [Aphid Notes.]—*Ochrana Rostlin*, iv, no. 2–3, pp. 17–24, 3 figs. Prague, May 1924.

A general account is given of the damage caused to various crops by Aphids. Those occurring in Czecho-Slovakia are listed, with notes on their habits and foodplants and suggestions for their control.

Farský (O.). **Svilušja smrkvá** (*Tetranychus ununguis* **Jacobi**).—*Ochrana Rostlin*, iv, no. 2–3, pp. 24–29. Prague, May 1924.

Paratetranychus (*Tetranychus*) *ununguis*, Jacobi, has caused serious damage to many conifers in Czecho-Slovakia since 1921. The work in connection with this mite done elsewhere and the remedial measures adopted are reviewed.

[Shtcherbinovski (N. S.).] **Щербиновский (Н. С.). Главнейшие Вредители Сельского хозяйства и меры борьбы с ними.** [The Chief Agricultural Pests and their Control.]—**Издательство Наркомзема « Новая Деревня »** [*Publ. Narkomzem "New Village"*], 136 pp., 56 figs. Moscow, 1924.

This is a popular handbook on the insect and other animal pests of European and Asiatic Russia, arranged according to the crops attacked. A brief account is given of their bionomics and control. Instructions are also given for the preparation and application of insecticides.

[Sviridenko (P. A.).] **Свириденко (П. А.). Биологические наблюдения над марокканской кобылкой.** [Biological Observations on the Moroccan Locust.]—**Издание Северной Областной Станции Защиты Растений от Вредителей** [Published by the *Northern Regional Station for the Protection of Plants from Pests*], 63 pp., 1 fold. table. Petrograd, 1924.

This paper is based on observations conducted in 1915 in the Elisavetpol province of Transcaucasia, on a special large experimental plot where the swarms of *Dociostaurus maroccanus*, Thnbg., under observation remained absolutely undisturbed during the whole period of development.

A study of the vegetation of the plot showed that the spots where the eggs of locusts were laid more densely than elsewhere correspond with the distribution of the grass *Poa bulbosa* f. *vivipara*, which forms more or less large colonies. Detailed observations on the emergence, growth and metamorphosis of the larvae are given. During the whole period meteorological observations were made, and the correlation

between the weather and the behaviour of swarms has been studied for the first time. The larval swarms start their daily march in the morning when the temperature reaches about 23–27° C. [73·4–80·6° F.] and they stop whenever it drops again to the same level, whether in the evening, or during the day owing to clouds or wind. At a temperature of about 30–33·5° C. [86–92·3° F.] the swarms also cease their movement, obviously from excess of heat. Thus, the movements of larvae are due to thermotaxis. Their climbing up the plants in the evening and their descent in the morning, however, are due to the direct influence of the sun's rays. The observations must be corrected to include the moisture, but no observations in that direction have been made. There is no definite regularity in the direction of movement of larval swarms, and separate swarms may be observed at the same time and under the same conditions moving in different directions.

The food-plants of larvae are not as numerous as they are supposed to be. The larvae in the first stage were feeding almost exclusively on *Poa bulbosa ;* later on they devoured *Medicago minima* and *Astragalus hamosus* also, while larger larvae became gradually less fastidious ; nevertheless, there were numerous plants that were never eaten, as, for instance, *Allium rubellum, Herniaria hirsuta, Adonis flammeus, Malcolmia contortoplicata, Euphorbia falcata, Malva transcaucasica,* and *Plantago coronopus.*

Observations on pairing and oviposition are described, and some cases of egg-laying by unfertilised females are recorded.

Natural enemies of *D. maroccanus* included hedgehogs, voles which devoured the larvae in enormous quantities, starlings, rooks, skylarks, *Glareola melanoptera* and other birds. Some lizards and a toad were also regularly fed on locust larvae of all stages, as well as on adults. Insect enemies were the wasps, *Tachytes* sp., and *Sphex* sp. The long-horned grasshopper, *Decticus* sp., feeds on locusts in all stages, and from the egg-masses, *Mylabris floralis armeniaca,* Fald., was bred.

To settle the question whether poisoning of locusts does not lead to poisoning birds and other animals that feed on them, a rook and some starlings were fed in captivity for a long time exclusively on poisoned larvae, but none of them showed any ill effects.

A series of experiments with various poisoned baits is described ; the best results were obtained with one composed of bran and a hot solution of sodium arsenite.

A table for the identification of the larval stages [*R. A.E.*, A, x, 547] is appended.

DE BERGEVIN (E.). **A propos de quelques Typhlocybinae (Hémiptères-Homoptères) nuisibles à la vigne.**—*Bull. Soc. Hist. nat. Afr. N.* xv, no. 3, pp. 107–111, 5 figs. Algiers, 1924.

The Jassids, *Empoasca* (*Chlorita*) *flavescens*, F., and a species of *Erythroneura,* probably *E. eburnea,* Fieb., have been found in great numbers in vineyards in Italy, the former probably being responsible for the damage done. It is cosmopolitan and quite likely to be introduced at any time into northern Africa ; it should therefore be watched for in that country. The author divides the subfamily TYPHLOCYBINAE, to which these Jassids belong, into two groups, characterised by the nervation of the hind wings, and lists the genera in these groups, comprising 9 in all.

CLEVELAND (L. R.). **The physiological and symbiotic Relationships between the intestinal Protozoa of Termites and their Host, with special Reference to *Reticulitermes flavipes* Kollar.**—*Biol. Bull. Marine Biol. Lab.*, xlvi, nos. 4 & 5, pp. 178–201, 203–227. Woods Hole, Mass., April–May 1924.

All the species and genera of the KALOTERMITIDAE, RHINOTERMITIDAE and MASTOTERMITIDAE that have been examined have been found to harbour large numbers of intestinal protozoa. None have been found in any individual of the remaining family, TERMITIDAE. The principal food of protozoa-harbouring termites is wood, the chief compound in the wood that the termites make use of being cellulose. All the protozoa are killed by incubation at 35°C. [96·8°F.] for 24 hours. The insects are apparently not injured at all, but those thus treated die within 10–20 days after incubation, if fed on their normal wood diet, their death being due, not to the incubation itself but to an inability to digest wood. When these Termites are fed on digested wood or fungus-digested cellulose, they live indefinitely, as they do also when reinfected with protozoa. It is therefore highly probable that the termites are dependent on the protozoa to digest their food.

Not all of the protozoa harboured by *Reticulitermes flavipes*, Kollar, digest wood particles. Some of them either live at the expense of the wood-digesting protozoa, or their host, or both. The relationship between some of the protozoa, particularly *Trichonympha* and *Pyrsonympha*, and their host, *R. flavipes*, is a symbiotic one.

CONSOLANI (G.) & DALMASSO (G.). **Un brillante successo nella lotta contro le tignuole dell'uva.** [A brilliant Success in Work against Vine Moths.]—Reprint, 14 pp., 3 figs., from *Il Contadino della Marca Trevisana*. Treviso, 1924.

In an outbreak of *Polychrosis botrana*, Schiff., in the province of Treviso, North Italy, the insecticide that found most favour was a 1 per cent. solution of a calcium arsenate sold as "Azol," of which nearly 200,000 gals. were applied against the spring generation, with the result that in cases where spraying was carefully done at an early date the mortality among the larvae was 90–95 per cent. With very late application this figure fell to 30 per cent. In consequence of this very little spraying with nicotine (3 per cent. solution) was needed for the second generation.

MALENOTTI (E.). **Contro le Grillotalpe.** [Against Mole-crickets.]—*Riv. Agric.*, xxix, no. 18, pp. 277–278. Rome, 2nd May 1924.

This is a résumé of the methods usually employed against mole-crickets.

v. LENGERKEN (H.). **Coleoptera. I.**—*Biol. Tiere Deutschlands*, Teil 40, pp. 1–36, 7 figs. Berlin, 15th May 1924.

This is part of the section on Coleoptera of a general treatise on the biology of the fauna of Germany [*R. A. E.*, A, xi, 199]. The beetles are dealt with generally according to their habitat and their association with other insects.

D[EWITZ] (J.). **Zur Bekämpfung der Rebschädlinge.** [The Control of Vine Pests.]—*Luxemburger Weinztg.*, xii, no. 7, pp. 71, 74–79. Grevenmacher, 5th April 1924.

The chief insect pests of vines in Luxemburg are the vine-moths, *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff. The insecticides recommended against the first generation are Urania green (which may be combined with Bordeaux mixture), Dr. Sturm's arsenical preparation, or pyrethrum-soap. Nicotine has given excellent results against the second generation. The best practical methods for preparing the sprays and using them are described from data already published.

PRELL (H.). **Ueber die Immunität von Fichten gegen Nonnenfrass und ihre Ursache.** [On the Immunity of Spruce Trees from Attack by the Nun Moth and its Cause.]—*Tharandter Forstl. Jahrb.*, lxxv, no. 2, pp. 58–71. Berlin, 1924.

Some trees remain entirely unattacked in stands of spruce severely infested with the nun moth, *Liparis monacha*, L. The various possible reasons for this were investigated, it being concluded that a chemical unsuitability of the needles was responsible. Needles from immune trees became acceptable to the larvae after soaking in water for 2 days, so that the active principle is evidently volatile. Immune needles have a marked odour of turpentine, and chemical examination proved them to contain considerably more turpentine than those of infested trees. The tannin content was nearly equal in both cases; the alkaloids were not tested. The excess of turpentine may prove to be the cause of immunity, but further research is necessary.

GESSNER (—). **Der Heu- und Sauerwurm in Baden in den Jahren 1922-23 und seine Bekämpfung.** [The first and second Generations of Vine Moths in Baden in 1922–23 and their Control.]—*Badische Blätter f. Schädlingsbekämpfung*, i, no. 1, pp. 4–8, 1 pl. Freiburg i. Br., October 1923. [Received 27th May 1924.]

Both generations of the vine-moths, *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff., have increased in Baden since 1921. As quite young larvae were observed together with the ordinary mature individuals, the occurrence of a third generation of *P. botrana* in 1922 and of a third generation of *C. ambiguella* in 1923 is thought to have taken place. Nicotine is considered to be the best insecticide for these pests, but arsenicals, such as Urania green, either as a solution or as a dust, are satisfactory and much cheaper. Very good results were obtained wherever these insecticides were properly applied at the right times.

SCHRÖDER (—). *Cleonus* (*Lixus*) *punctiventris*, **Germ., ein Rübenschädling des Ostens.** [*Bothynoderes punctiventris* a Beet Pest of Eastern Europe.]—*Badische Blätter f. Schädlingsbekämpfung*, i, no. 1, p. 9. Freiburg i. Br., October 1923. [Received 27th May 1924.]

The weevil, *Bothynoderes* (*Cleonus*) *punctiventris*, Germ., is a dangerous pest of sugar and fodder beet in south-eastern Europe, but has never been recorded as injurious further west [*cf.* however *R. A. E.*,

A, x, 266]. In Baden it has been found very seldom, if at all, and there are only isolated records from other parts of Germany. Beet growers in Hungary are required by law to combat *B. punctiventris*, and the measures adopted include trap-trenches, hand-collection or allowing turkeys to destroy the insects, and spraying with arsenicals or barium chloride.

Schwär (H.). **Einiges über Herkunft, Biologie und Bekämpfung der Blutlaus** (*Schizoneura lanigera* **Hausm.**). [Some Notes on the Origin, Biology and Control of the Woolly Aphis, *Eriosoma lanigerum*.]—*Badische Blätter f. Schädlingsbekämpfung*, i, nos. 1 & 2, pp. 10–15. Freiburg i. Br., October 1923 & April 1924.

A summary is given of existing knowledge of the woolly Aphis, *Eriosoma* (*Schizoneura*) *lanigerum*, Hsm.

Schuster (W.). **Der Getreideblasenfuss** (*Thrips cerealium*) [The Grain Thrips, *T. cerealium*.]—*Badische Blätter f. Schädlingsbekämpfung*, i, no. 2, pp. 15–18. Freiburg i. Br., April 1924.

Attention is drawn to the considerable amount of injury done to cereal crops by various species of thrips, but not attributed to them. Dr. Straňák's list of the different species found on different cereals is given [*R. A.E.*, A, x, 503]. Work against these pests must of necessity be largely of a preventive character and consists principally in avoiding conditions favourable to them.

Frickhinger (H. W.). **Vogelschutz als Pflanzenschutz.** [Bird Protection as a Means for Plant Protection.]—*Badische Blätter f. Schädlingsbekämpfung*, i, no. 2, pp. 19–21. Freiburg i. Br., April 1924.

A number of cases are instanced as actual practical examples of insect outbreaks directly checked by birds in Germany and Czecho-Slovakia. One of these cases has been noticed already [*R. A.E.*, A, x, 257].

Willaume (F.). **Technique élémentaire des élevages d'insectes.**—*Rev. Hist. nat. appl.*, Ire Partie, v, nos. 2 & 3, pp. 44–64 & pp. 87–96, 15 figs. Paris, February & March 1924.

Suitable apparatus and methods for rearing insects are described and illustrated, and the technique of the various processes is explained.

Buchner (P.). **Tier und Pflanze in intrazellularer Symbiose.** [Animals and Plants in Intracellular Symbiosis.]—xi+462 pp., 103 figs., 2 pls. Berlin, Gebrüder Borntraeger, 1921.

This volume summarises present day knowledge of intracellular symbiosis in plants and animals. The chapters dealing with this phenomenon in insects contain the results of the author's own investigations. The insects are grouped into omnivorous, wood-eating, plant-sucking, and blood-sucking species. In the section on light symbiosis, a chapter is devoted to luminous Coleoptera,

VOGT (E.). **Methoden der Schädlingsbekämpfung. III.** [Methods for Combating Diseases and Pests of Plants. III.]—*Centralbl. Bakt., Paras. & Infekt.*, IIte. Abt., lxi, no. 11–18, pp. 323–356. Jena, 20th May 1924.

The various methods of soil disinfection are reviewed from a general point of view. This is the third of the series [*R. A. E.*, A, xi, 157], the second having dealt with measures against fungous pests.

BIRON (M.). **Influence du buttage sur la mortalité des chrysalides d'Eudémis.**—*Progrès agric. et vitic.*, lxxxi, no. 22, pp. 526–527. Montpellier, 1st June 1924.

In certain districts of the Rhine the vine stocks are regularly earthed up in November and December, the mounds being cleared again about the following March. This practice protects the plant and encourages the development of entomophagous fungi, which thus destroy a large number of the pupae of the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.].

DE FLEURY (P.) **Etude sur trois Lépidoptères producteurs de soie de la Guinée française.**—*Bull. Comité Etudes hist. & scientif. Afrique occid. fr.*, vii, no. 1, pp. 39–49. Paris, January–March 1924.

In Madagascar, a local silk industry has been established to utilise the products of several species of moths such as *Coenostaegia* spp. and *Borocera madagascariensis*.

An account is given of three of the silk producing moths that occur in French Guinea, which, it is thought, might be used for a similar purpose. They are a Lymantriid, *Coenostaegia* sp., a Saturniid, *Epiphora bauhiniae*, Guen., and a Lasiocampid, *Chrysopsyche imparilis*.

FORSIUS (R.). **Ueber eine Massenzucht von** *Hyponomeuta padi* **L.** [A Mass-breeding of *H. euonymellus*, L.]—*Notulae Entomologicae*, iv, no. 2, pp. 44–46. Helsingfors, 20th May 1994.

The following results obtained from pupae of *Hyponomeuta euonymellus*, L. (*padi*, Z.) are of interest because the parasites of this species also attack *H. malinellus*, Zell., and *H. cognatellus*, Hb. Of 11,156 pupae only 37 per cent. yielded moths, 25·1 being parasitised by *Angitia armillata*, Gr., 20·7 by *Pimpla examinator*, F., and the rest by other parasites, including *Mesochorus brevipetiolatus* Ratz., a fly, *Sarcophaga affinis*, Fall., and the following Hymenoptera, mostly hyperparasites: *Pezomachus* (*Gelis*) *corruptor*, Först.; P. (*G.*) *instabilis*, Först.; P. (*G.*) *vagans*, Ol.; P. (*G.*) *tonsus*; numerous specimens of an unidentified Chalcid; *Hemiteles scabriculus*, Ths.; *H. areator*, Pz.; *Pimpla turionellae*, F.; *Mesochorus pectoralis*, Hgn.; *Sagaritis zonatus*, Gr.; *Leptocryptus aereus*, Gr.; *Pimpla* (*Itoplectis*) *maculator*, Gr.; and *Canidia* sp.

In 1910 larvae of *H. euonymellus* were common on bird cherry [*Prunus padus*], and were parasitised to the extent of about 20 per cent. In 1911 the trees were extremely severely attacked, but about 60 per cent. of the larvae were parasitised. In the following years the trees were almost completely uninfested, parasites, chiefly *A. armillata* and *P. examinator*, being apparently responsible.

Morstatt (H.). **Bibliographie der Pflanzenschutzliteratur. Das Jahr 1923.** [A Bibliography of Plant Protection Literature in 1923.]— *Biol. Reichsanst. Land- u. Forstwirtschaft*, iv+176 pp. Berlin, 1924.

The subject of this publication is indicated by its title. Previous years from 1914 have already been noticed [*R. A. E.*, A, xi, 373, etc.]

De Stefani (T.). **Il** *Piezodorus incarnatus* (**Germ.**) **nei frutteti.** [*P. incarnatus* in Orchards.]— *Ann. R. Staz. sperim. Agrum. e Fruttic.*, vii, pp. 37–42. Acireale, 1923. [Received 4th June 1924.]

Much of the information given here has been already noticed [*R. A. E.*, A, x, 602]. The Pentatomid bug, *Piezodorus incarnatus*, Germ., infests the trunks of almonds and of *Olea fragans* in addition to attacking various fruits, those injured by it being more or less valueless. Remedial measures are difficult to apply in practice, but spraying with nicotine and soap or with tar oil and soda appears to be the most feasible. These insecticides remain semi-liquid for some time, and their odour repels the bugs.

Vitale (F.). **L'** *Anthonomus ornatus* **Reich. del mandorlo.** [*A. ornatus* of the Almond.]— *Ann. R. Staz. sperim. Agrum. e Fruttic.*, vii, pp. 43–48. Acireale, 1923. [Received 4th June 1924.]

The weevil, *Anthonomus ornatus*, Reiche, and its variety *messanensis*, Vit., occurs in all stages in the flower buds of the sweet almond, *Amygdalus communis* var. *dulcis*, and rarely in those of the bitter almond, *A. communis*. In Sicily between early December and late January, according to the altitude, the female oviposits in the buds, only one egg being laid in each. In 6–8 days the larva hatches and begins feeding on the tender internal parts of the bud. It ultimately cuts the tissues at the point of attachment to the branch, and the infested bud soon drops to the ground. The larval stage lasts about 30 days and the pupal stage 15–25 days.

The weevils rest for 1 or 2 days before emerging from the bud, and after a period of 15–30 days, they disappear with the advent of hot weather. During 42 years the author has failed to find *A. ornatus* from June to November in the open. It aestivates under the bark or in deep cracks in almond trees. During the past 34 years evidence has been gathered of the serious injury this weevil causes to almond blossoms. In years of severe infestation 10 per cent. of the buds are destroyed. The only practical measure is the collection and destruction of infested buds every day for a month from December to January. Some birds, such as tits, are the only useful natural enemies of this pest.

Morrison (H.). U.S. Bur. Ent. **The Coccidae of the Williams Galapagos Expedition.**— *Zoologica*, v, no. 13, pp. 143–152, 5 figs. New York, 27th February 1924.

Among the species dealt with the following are described as new from the Galapagos Islands: *Margarodes similis*, from rootlets of *Maytena*, and other plants; *Eriococcus papillosus*, from stems of *Heliotropium parviflorum*; *Phenacoccus parvus*; *P. galapagoensis*; and *P. insularis*.

COTTON (R. T.). U.S. Bur. Ent. **The Identity of** *Sitophilus* (*Calandra*) *rugicollis*, **Casey** (*Coleop.*).—*Proc. Ent. Soc. Wash.*, xxvi, no. 5, p. 141. Washington, D.C., May 1924.

Calandra shoreae, Mshl. [*R. A. E.*, A, ix, 90], is stated to be identical with *C. rugicollis*, Casey, which was described from a single specimen said to have been taken in Florida. *C. rugosicollis*, Hustache, is also a synonym of it. It does not seem probable that this species will occur again in Florida unless it is accidentally reintroduced from India, where it is undoubtedly indigenous.

MARCOVITCH (S.). **The Migration of the Aphididae and the Appearance of the Sexual Forms as affected by the relative Length of Daily Light Exposure.**—*Jl. Agric. Res.*, xxvi, no. 7, pp. 513–522. Washington, D.C., 16th February 1924.

This is a more detailed account of experiments previously noticed [*R. A. E.*, A, xii, 118].

MILES (H. W.). **A Survey of the Insect Pests of Cruciferous Crops.**—*Kirton Agric. Inst.*, Bull. 1, 39 pp., 19 figs. Kirton, Lincs., May 1924; price 1*s.* also in *Jl. Bath & West & S. Counties Soc.*, 5th Ser. xviii., 1923–24.

A key is given for the identification of insect pests of Cruciferous crops based on the character of the injury to the plant, and a short account is given of each, with suitable remedies for them.

RAMSAY (A. A.). **A Home-made Tobacco Wash for Combined Sprays.**—*Agric. Gaz. N.S.W.*, xxxiv, pt. 1, pp. 58–60.

RAMSAY (A. A.) & GRIFFITHS (E. L.). **The Preparation of Home-made Tobacco Wash.**—*Ibid.*, xxxv, pt. 4, pp. 295–297. Sydney, 1st January 1923 and 1st April 1924.

Satisfactory results have been obtained in laboratory experiments in obtaining a home-made tobacco infusion or extract that can be mixed with lime sulphur without any change taking place in the combination. The materials used are 2 lb. waste tobacco (dust), 3 gals. water and 7 oz. quicklime. The quicklime is slaked with a small quantity of the water heated nearly to boiling point, the mixture then being added to the balance of the water. To this the tobacco dust is added, the whole being well stirred and allowed to react for 36 hours and the mixture being well mixed from time to time. The liquid is then strained off and the residue washed with clean water which is added to the liquid until it measures 3 gals. The infusion thus obtained must be diluted with an equal quantity of water before use. It is very much cheaper than a spray of similar strength prepared from commercial tobacco wash.

Details are given of the experiments and the mean extraction obtained after allowing the mixture to react for varying lengths of time (2 to 7 days).

This preparation may be safely used for combination sprays such as Bordeaux mixture, lead arsenate and tobacco wash.

QUINN (G.). **The Mediterranean Fruit-fly** (*Ceratitis capitata*, **Wied.**).— *Jl. Dept. Agric. S. Australia*, xxvii, no. 9, pp. 852–855, 6 figs. Adelaide, 15th April 1924.

Recent outbreaks of *Ceratitis capitata*, Wied., in Victoria and New South Wales have again drawn attention to the menace to fruit-growers in South Australia from this pest, which, however, has not yet appeared within the State. An account is given of the life-history and habits of, and remedies for, this fly.

Departmental Activities. Entomology.— *Jl. Dept. Agric. Union S. Africa*, viii, no. 5, pp. 450–452 & 457. Pretoria, May 1924.

In the Kalahari, Sphegid wasps are reported to be destroying many locusts in the hopper stage. Besides the Trypetids known as pumpkin-flies, there are several species that infest the pods of milkweeds (Asclepiadaceae), and it has recently been found that at least one of these, *Dacus brevistylus*, Bezzi (lesser pumpkin fly) feeds both on the weed and on Cucurbits. It has also been found infesting green beans in Pretoria, and if other food-plants are involved, it may become an increasingly serious pest. A weevil, a species of *Gonipterus* [*scutellatus*, Gyl.], has been observed severely infesting *Eucalyptus amygdalina* at Kingwilliamstown. It is already a pest in south-western Cape Province, and its appearance in the former locality indicates rapid dispersal of the insect by some means. Scattered outbreaks of *Laphygma exempta* (mystery army-worm) indicate wide distribution of this pest. Attempts to establish two Italian parasites of the codling moth [*Cydia pomonella*] have proved a failure, neither *Calliephialtes pimpla*, nor the egg parasite, *Ascogaster*, proving of practical value. The former is, however, still being bred.

WALLACE (F. N.) & OTHERS. **Report of the Division of Entomology.**— Separate from *5th Ann. Rept. Indiana Dept. Conservation 1923*, 19 pp. Indianapolis, 1924.

Macronoctua onusta, Grote (iris root borer) is the most serious insect pest of these plants; it occurs throughout the eastern United States and in parts of Canada, its spread having been caused by the shipping of infested rhizomes. *Chionaspis pinifoliae*, Fitch, is found on various kinds of pine, spruce and fir. A large number of southern-grown tomato plants were infested by the Nematode, *Heterodera radicicola*, Greef, the life cycle of which is briefly described. There was an unusual outbreak of the fall web-worm [*Hyphantria cunea*, Drury] on shade and forest trees, the measures recommended against it being burning the nests and destroying the caterpillars by spraying with lead arsenate 1 oz., cheap soap 1 oz., and water 1 U.S. gal. The tussock moth [*Hemerocampa leucostigma*, S. & A.] was also very abundant and the snow-white linden moth [*Ennomos subsignarius*, Hb.] was even more destructive than in the previous year [*R. A. E.*, A, xi, 309]. Many young forest trees were killed by the oyster-shell scale [*Lepidosaphes ulmi*, L.].

CHAMBERLIN (T. R.). **Introduction of Parasites of the Alfalfa Weevil into the United States.**— *U.S. Dept. Agric.*, Dept. Circ. 301, 9 pp., 5 figs. Washington, D.C., April 1924.

Hypera variabilis, Hbst. (*Phytonomus posticus*, Gyll.) (alfalfa weevil) has become so destructive in the United States that a study has been

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made of its parasites in Europe. Twelve of these have been introduced into America, the more promising being *Anaphoidea luna*, Gir., the adults of which emerge from 13th May to 11th June; *Eupelminus excavatus*, Dalm., which emerges chiefly after 3rd October, the larvae feeding upon egg-masses throughout the early part of the year and then aestivating and emerging in autumn; *Dibrachiodes dynastes*, Först., an external feeder on the pre-pupa and pupa of the weevil; an unidentified Pteromalid similarly parasitic on the eggs; and *Bathyplectes curculionis*, Thoms.

The last-named seems to be by far the most useful, and has increased until it now destroys over 90 per cent. of the weevils in the older sections, its hardiness and fecundity making it very promising. Much of the improvement in the crop must, however, be attributed to improved weather conditions, and it is not until there have been seasons favourable to the weevils rather than to lucerne that the true value of the parasites can be estimated. *B. curculionis* is attacked by the secondary parasites, *Mesochorus nigripes*, Ratz., *Pezomachus* (*Gelis*) *steveni*, Grav., *Dibrachys boucheanus*, Ratz., and *Eupteromalus* sp.

Peirson (H. B.). **Insects attacking Forest and Shade Trees.**—*Maine Forest Serv.*, Bull. 1, 56 pp., 8 pls. Augusta, Me., 1923. [Received 6th June 1924.]

The most serious problem for Maine foresters is the practical control of the spruce-bud worm [*Tortrix fumiferana*, Clem.], which has destroyed fully 40 per cent. of the merchantable fir and spruce in the State [*R. A. E.*, A, ix, 241]. The only possibility of controlling this moth at present is by forest management. The types of forest growth throughout Maine are being mapped out, and the forests are being patrolled, so that fresh infestations are at once reported. If an infestation proves serious, the owner is notified and requested, if possible, to clean out the spruce and fir in that area during the winter operations. As the greatest damage always occurs in pure stands of spruce and fir, a mixed spruce-hardwood forest should be encouraged. Fir killed by budworm should be salvaged within 3 years for pulp purposes, and spruce within 5 or 7 years, but for lumber purposes all trees should be salvaged immediately. It appears to be the rule that the more rapid the growth of spruce and fir, the more rapid their deterioration after death. Those growing in swamps or shallow ground soon dry out, but in more favourable sites they contain more sap and remain favourable to insects and fungi for a much longer period. Great savings could be made if these factors were taken into consideration when planning cutting operations.

An account is given of minor pests of spruce and fir, and of the insects attacking white pine, larch, hardwoods and shade trees, most of the information having been noticed previously. A bibliography of economic references is given.

Yost (C. O.). **Brood and Adult Bee Diseases in Indiana.**—*Dept. Conserv. Indiana*, Pubn. 43, 16 pp. Indianapolis, April 1924.

The diseases dealt with are European and American foulbrood (the alcohol formalin treatment for the latter being explained), dysentery, sac brood, paralysis, May disease and Isle of Wight disease.

Harned (R. W.) & others. *Biennial Report of the State Plant Board of Mississippi for the Years 1922 & 1923*, 102 pp. [A. & M. College, Miss.] 1924.

The work included investigations on the following insect pests; *Pseudaonidia duplex* (Japanese camphor scale), every effort being made to prevent its establishment; the cottony cushion scale [*Icerya purchasi*], in connection with which the work of the liberation of *Novius cardinalis* is of great importance; and the Mexican bean beetle [*Epilachna corrupta*]. The various inspection services are reported on by those in charge of them, in which connection J. E. Lee briefly describes the experiments with the Florida method [*R. A. E.*, A, xi, 73] carried out against the boll weevil [*Anthomomus grandis*] with apparently satisfactory results. Strawberries were heavily infested with *Haltica ignita* (strawberry flea-beetle), and an attempt was made to control it by the application of calcium arsenate dust. This lessened the injury to some extent, and excellent results were obtained with this dust against the cotton leaf worm [*Alabama argillacea*].

Webb (J. L.). **How Insects affect the Rice Crop.**—*U.S. Dept, Agric.*, Farmers' Bull. 1086, 9 pp., 8 figs. Washington, D.C., March 1920, revised February 1924.

This information is substantially the same as noticed from a previous bulletin [*R. A. E.*, A, viii, 300].

Price (R. C.). **Arsenicals for the Tomato Fruit Worm.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, iv, no. 1, pp. 24–26. A. & M. College, Miss., April 1924.

Recent tests with various forms of arsenical sprays for the control of *Heliothis obsoleta* on tomatos have proved the efficacy of such treatment in protecting the plants. Applications should be made as soon as the first injury is noticed and continued at intervals of a week or ten days up to within two weeks of picking time. These measures are also effective against the tomato hornworm [*Protoparce celeus*] and blister beetles.

Lyle (C.). **Controlling Melon Pests.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, iv, no. 1, pp. 26–29. A. & M. College, Miss., April 1924.

The chief pests of melons and cantaloups in Mississippi are *Diabrotica vittata* (striped cucumber beetle) and *Diaphania nitidalis* (pickle worm). The simplest remedy is nicotine dust containing 6 to 10 per cent. of nicotine sulphate or lead arsenate dust, at the rate of 1 lb. to 15 lb. slaked lime, may be applied from the time the plants are above ground for as long as *D. vittata* is present in injurious numbers. The use of squashes as a trap crop is the best measure against *D. nitidalis*.

Mexican Bean Beetle Distribution, 1923.—*Qtrly. Bull. State Pl. Bd. Mississippi*, iv, no. 1, pp. 29–31, 1 map. A. & M. College, Miss., April 1924.

The spread of the Mexican bean beetle [*Epilachna corrupta*, Muls.] in the United States is illustrated by a map. There does not appear to

be any immediate danger of a serious invasion of Mississippi. The westward spread is very slow, but the importance of keeping a careful lookout for this pest is great.

Hester (J. G.). **Fall Webworm Control Measures.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, iv, no. 1, pp. 31–33. A. & M. College, Miss., April 1924.

In view of the expected abundance of the fall webworm [*Hyphantria cunea*, Drury] during 1924, suggestions are made for its control, especially in pecan groves. A spray consisting of 1 lb. lead arsenate powder, 50 U.S. gals. water, 5 lb. slaked lime, and 3 or 4 lb. soap should be applied as soon as the egg masses begin to hatch. Where Bordeaux mixture is used, the lead arsenate may be added to it. Other measures are the clearing and burning of the webs and the application of sticky bands.

Tucker (C. M.). **The Coconut Bud-rot in Porto Rico.**—*Agric. Notes, Porto Rico Agric. Expt. Sta.*, Mayaguez, no. 2, 2 pp. San Juan, P.R., 15th April 1924.

Insects are one of the means of dissemination of coconut bud-rot in Porto Rico, and the decaying buds are also very attractive to them, the rotted portions frequently containing numbers of larvae.

Bondar (G.). **Nota addicional sobre insectos damninhos ao coqueiro.** [An additional Note on Insects injurious to the Coconut.]—*Correio-Agricola*, ii, no. 4, pp. 111–112, 2 figs. Bahia, April 1924.

This is an addendum to a paper already noticed [*R. A. E.*, A, xi, 120]. A Cassid beetle, *Platiauchenia deyrollei*, Guér., attacks the foliage of coconut palms and its larva lives in the axils of the young leaves. The adults of *Metaxyonycha testacea*, F., and *M. hybrida*, Lef., feed on the foliage; their larvae are unknown.

Bondar (G.). **Thrips de alfafa e ervilha** (*Heliothrips fasciatus* **Pergande).** [The Lucerne and Pea Thrips, *H. fasciatus*.]—*Correio-Agricola*, ii, no. 4, pp. 112–113, 1 fig. Bahia, April 1924.

Heliothrips fasciatus, Perg., which is well-known in North America, has now been observed in the State of Bahia, attacking lucerne, peas, beans, etc., and is probably indigenous in Brazil. Seed should be treated with carbon bisulphide, and patches of infested plants should be destroyed.

Bondar (G.). **Biologia do genero** *Collabismus* **(Fam. dos Curculionideos).** [The Biology of the Genus *Collabismus*.]—*Arch. Esc. sup. Agric. & Med. vet.*, vii, no. 1–2, pp. 23–24, 1 pl. Nictheroy (Rio de Janeiro), December 1923. [Received 10th June 1924.]

Collabismus clitella has been observed in the State of S. Paulo on *Solanum lycocarpum*. This weevil oviposits in the green twigs, and the presence of the larva gradually gives rise to a gall. Development requires a year, and in October the weevils emerge from the galls and feed on the bark of new twigs.

DA COSTA LIMA (A.). **Nota sobre as especies do genero** *Eucalymnatus* **(Fam. Coccidae, sub-fam. Coccinae).** [A Note on the Species of the Genus *Eucalymnatus*.]—*Arch. Esc. sup. Agric. & Med. vet.*, vii, no. 1–2, pp. 35–44, 2 pls. Nictheroy (Rio de Janeiro), December 1923. [Received 10th June 1924.]

Food-plants of *Eucalymnatus tessellatus*, Sign., additional to those in the author's catalogue [*R. A. E.*, A, xi, 366] are given.

New species are *E. spinosus* ; *E. magarinosi* and *E. hempeli* from mango (*Mangifera indica*). *E. gracilis*, Hemp., subsp., *nictheroyensis*, n., is also described, from ? *Cestrum nocturnum*, and a key to the species of the genus is given.

In an addendum attention is drawn to the possibility of *E. hempeli* being synonymous with *E. chelonioides*, Newst. [A, v, 456] and *E. magarinosi* is similar in some respects to *E. decemplex*, Newst. [A, viii, 119].

BERNARD (C.). **Verslag van het Algemeen Proefstation voor Thee over het Jaar 1923.** [Report of the General Tea Experiment Station for 1923.]—*Meded. Proefst. Thee*, no. 87, 34 pp. [Buitenzorg] 1924.

In 1923 only a few estates suffered serious damage by *Helopeltis*. The planting of green manures on a large scale seems to be the best measure against this pest. Besides the Nematode parasite already recorded [*R. A. E.*, A, ix, 493 ; x, 175], there is also a Hymenopterous parasite of *Helopeltis*, which is a useful auxiliary. An account of it is being prepared. The orange mite, *Brevipalpus* [*obovatus*], increased in consequence of the prolonged drought, but on the whole little injury resulted. There was a sporadic outbreak of the yellow mite, *Tarsonemus* [*translucens*]. Less injury than in previous years was done by caterpillar pests, such as *Stauropus*, *Andraca*, *Setora*, etc. Various weevils and Aphids were responsible for severe attacks, especially after the bushes had been pruned.

FAURE (J. C.). **Les Insectes des Arbres fruitiers. Procédés de lutte.**—*Progrès agric. & vitic.*, lxxxi, nos. 19, 21 & 23, pp. 442–447, 490–496 & 539–547, 3 pls. Montpellier, 11th & 25th May & 8th June 1924.

An account is given of the fruit-pests commonly found in France, classified under the food-plants they attack, with the remedies that are considered the most successful against each.

VOUKASSOVITCH (P.). **Contribution à l'étude de l'Eudémis** (*Polychrosis botrana*, **Schiff.), de la Pyrale de la Vigne** (*Oenophthira pilleriana*, **Schiff.) et de leurs parasites.**—248 pp., 43 figs. Toulouse, E. H. Guitard, 1924. Price Fr. 20.

This thesis, presented to the Faculty of Sciences of Toulouse, consists of four parts dealing respectively with the history and morphology of these moths, their biology and insect parasites, and remedial measures, including cultural methods, mechanical means, both physical and chemical, and biological methods of control. With regard to the last, 5 Hymenopterous parasites of *Polychrosis botrana* not previously

recorded from France, and 15 additional Hymenopterous and Dipterous parasites of *Sparganothis* (*Oenophthira*) *pilleriana* have been observed in this investigation, but none of them is of much value in control.

FUJIMOTO (I.). **On some Methods of preventing and exterminating *Kakivoria flavofasciata*, Nagano.**—*Konchû Sekai* [*Insect World*], xxv, no. 9, pp. 291–295. Gifu, 1921. In Japanese. (Abstract in *Jap. Jl. Zool.*, i, no. 1, p. 14. Tokyo, 1922.) [Received 1st July 1924.]

Kakivoria flavofasciata, Nag., is injurious to persimmon in Japan [*R.A.E.*, A, vi, 449]. This moth has two generations a year, the first lasting from late May to early June, and the second from late July to early August. The eggs are deposited on the bud at the base of the leaf-stalk or between them. The larva on hatching penetrates the bud and makes its way to the fruit, from which it probably migrates before the fruit falls off.

AMARI (S.). **On the Hosts of a Pediculoid Mite, parasitic on the Silkworm, with a Note on Fumigation Experiments.**—*Sangyo Shikenjo Hokoku*, v, pp. 475–483 [*sine loco*] 1921. In Japanese. (Abstract in *Jap. Jl. Zool.*, i, no. 1, p. 31. Tokyo, 1922.) [Received 1st July 1924.]

The Gelechiid, *Sitotroga cerealella*, Ol., is the favourite host of a Pediculoid mite that infests the silkworm, but many other Lepidoptera are also attacked by it, as well as a beetle, *Dermestes coarctatus*, Hld., *Musca domestica*, L., and an ant, *Camponotus* sp.

Fumigation for 24 hours with 3 lb. carbon bisulphide to 1,000 cu. ft. kills the mite in all stages. For disinfecting straw-thatched houses, a lighter gas such as hydrocyanic acid is more effective. This mite occurs in various parts of Japan.

SASAKI (C.). **A new Mite, *Tyroglyphus muscae*, parasitic on the Pupa of the Silkworm Fly.**—*Sangyo Shikenjo Hokoku*, v, pp. 483–494, 1 pl. [*sine loco*] 1921. In Japanese. (Abstract in *Jap. Jl. Zool.*, i, no. 1, p. 31. Tokyo, 1922.) [Received 1st July 1924.]

Tyroglyphus muscae, sp. n., destroys the pupae of *Crossocosmia* (*Ugimyia*) *sericariae*, Rond., a Tachinid parasite of silkworms, which hibernates underground in the pupal stage in cold seasons. The mite also attacks the silkworms themselves, and they must be protected against it.

AMARI (S.). **Studies on a Pediculoid Mite which infests the Silkworm. III.**—*Sangyo Shikenjo Hokoku*, v [*sine loco*] 1921. In Japanese. (Abstract in *Jap. Jl. Zool.*, i, no. 1, p. 31. Tokyo, 1922.) [Received 1st July 1924.]

In a further study of this question [*cf. R.A.E.*, A, vii, 152; viii, 24], the author states that the black patches found on the bodies of silkworms infested by a Pediculoid mite are produced by its bite. The pupae and adults are also attacked.

Hempel (A.). **As Pragas e Molestias do Arroz no Estado de S. Paulo.** [Pests and Diseases of Rice in S. Paulo.]—*Rev. Mus. Paul.*, xii, no. 2, pp. 147–150. São Paulo, 1920.

The pests of rice in São Paulo include the moth, *Remigia punctularis*, Hb. (*repanda*, auct.), the ants, *Atta sexdens*, L., and *Acromyrmex* sp., and the beetles, *Calandra oryzae*, L., and *Euetheola humilis*, Burm. The last-named attacked rice planted on old pasture and low-lying lands, cutting off the plants at the ground level and doing most damage in October and November. The best measure consists in flooding the rice-fields when the adults appear and planting as late as possible.

Hempel (A.). **Descripções de Coccidas novas e pouco conhecidas.** [Descriptions of new and little known Coccids.]—*Rev. Mus. Paul.*, xii, no. 2, pp. 331–377. São Paulo, 1920. [With an English translation.]

The new Coccids from Brazil described are *Monophlebus niveus*, on the roots of cultivated cassava and on *Grevillea robusta*; *Icerya chilensis*; *I. flava*; *I. paulista*; *I. taunayi*; *Orthezia grandis*; *O. longipes*; *Lachnodiella taquarae*; *Mesolecanium argaformis* and *M. marmoratum* on *Canella* spp.; *M. uvicola* infesting grape vines from Chile; *Neolecanium ferum* on *Croton floribundus*; *Eulecanium melzeri*; and *Megalecanium* (gen. n.) *testudinis*. *Icerya purchasi*, Mask. var. *citriperda* n., attacks oranges, roses and many other cultivated plants.

Other species are *Icerya schrottkyi*, Hemp., on *Jacaranda* and other plants and *Ceroplastes psidii*, Chav., which does serious damage to guava trees in Pernambuco.

Hempel (A.). **Hemipteros novos ou pouco conhecidos da familia Aleyrodidae.** [New or little known Rhynchota of the family Aleurodidae.]—*Rev. Mus. Paul.*, xiii (1922), pp. 1121–1191, 2 pls., 1 fig. São Paulo, 1923. [With an English translation.]

The new Aleurodids described from Brazil and Argentina are *Aleurodicus maritimus* on guava; *A. marmoratus* on *Baccharis genistelloides*; *Nealeurodicus* (gen. n.) *paulistus* on *Myrciaria jaboticaba*; *Bemisia poinsettiae* on *Poinsettia*; *Pseudaleyrodes* (gen. n.) *depressus* on *Maybenus aquifolium*; *Aleurodes albescens* on coffee; *A. latus* on *Baccharis genistelloides*; *Nealeyrodes* (gen. n.) *bonariensis* on *Eryngium pandanifolium*; *Aleurotrachelus distinctus* on *Solanum*; *A. fenestellae* on *Baccharis genistelloides*; *Leuderwaldtiana* (gen. n.) *eriosemae* on *Eriosema heterophyllum*; *Aleurothrixus miconiae* on *Miconia* sp.; and *Pseudaleurolobus* (gen. n.) *jaboticabae* on *Myrciaria jaboticaba*.

Other species from the same districts include *Aleurodicus flavus*, Hemp., on coconut palms; *A. neglectus*, Quaint. & Bak., on guava, *Anona* spp. and coconut; *A. giganteus*, Quaint. & Bak., on laurel; *Aleurothrixus aepim*, Goeldi, on cassava and orange; and *Aleuronudus induratus*, Hemp., *Ceraleurodicus splendidus*, Hemp., *Octaleurodicus nitidus*, Hemp., *Pseudaleurodicus bahiensis*, Hemp., *Aleurotrachelus atratus*, Hemp., and *A. stellatus*, Hemp., all on coconut palms.

Bondar (G.). **Notas biologicas sobre alguns buprestideos brasileiros do genero *Colobogaster* Solier.** [Biological Notes on some Brazilian Buprestids of the Genus *Colobogaster*.]—*Rev. Mus. Paul.*, xiii (1922), pp. 1267–1276, 8 figs. São Paulo, 1923.

The Buprestids dealt with include *Colobogaster cyanitarsis*, Gory, and *C. chlorosticta*, Klug, destructive to trees in the towns and orchards of São Paulo; *C. quadridentata*, L., attacking fig and other trees in Bahia; and *Conognatha magnifica*, Gory, *C. amoena*, Kirby, and *C. pretiosissima*, Chev., all pests of *Myrciaria jaboticaba* trees in São Paulo, besides attacking other Myrtaceae of no economic importance.

Bodenheimer (F.). **Beiträge zur Kenntnis der Kohlschnake (*Tipula oleracea* L.). Zur Anatomie und Oekologie der Imago.** [Contributions to the Knowledge of *T. oleracea*. On the Anatomy and Ecology of the Imago.]—*Zeitschr. wiss. Zool.*, cxxi, no. 3, pp. 393–441, 25 figs. Leipzig, 10th December 1923.

The title of this article sufficiently indicates its contents.

Campbell (R. E.) & Davidson (W. M.). **Notes on Aphidophagous Syrphidae of Southern California.**—*Bull. S. California Acad. Sci.*, xxiii, nos. 1–2, pp. 3–9, 59–71, 4 pls., 3 figs. Los Angeles, Cal., January–April 1924.

The Aphid-destroying Syrphids dealt with from South California belong to the genera, *Eupeodes*, *Allograpta*, *Catabomba*, *Syrphus*, *Sphaerophoria*, *Baccha* and *Paragus*. Most Syrphid larvae eat voraciously, the number of Aphids eaten varying according to their size and instar. There is also a considerable diversity in the bulk of food consumed. Various records are given, *e.g.*, the following for single larvae of *Eupeodes*: 142 *Brevicoryne brassicae* (all stages); 239 *Myzus braggi* (stage iii); 341 *Macrosiphum rosae* (stages i-iv); 405 *Acyrthosiphon* (*Illinoia*) *pisi* (stage i); 226 *Aphis gossypii* (stages iii-v); 252 *Myzus persicae* (stages ii-v); 186 *Aphis maidis* (stages i-iv).

Lacroix (D. S.). **The Occurrence of an important European Parasite in North America (Hymen. : Elachertidae).**—*Ent. News*, xxxv, no. 6, p. 217. Philadelphia, Pa., June 1924.

Euplectrus bicolor, Swed., was reared from a loose, matted mass of silken filaments surrounding a dead larva of *Agrotis c-nigrum*, L. (spotted cutworm), this being the first record of this Elachertid from North America. The cranberry bog in Massachusetts on which it occurred was heavily infested with the larvae of this cutworm.

Viereck (H. L.). **Descriptions of new Hymenoptera in the Canadian National Collection, Ottawa.**—*Canad. Ent.*, lvi, no. 5, pp. 110–112. Orillia, Ont., May 1924.

Among the species described is *Telenomus alsophilae*, sp. n., reared from eggs of the fall canker-worm (*Alsophila pometaria*) in Nova Scotia.

Champion (G. C.). **Notes on the Apple Anthonomi.**—*Ent. Mo. Mag.*, lx, pp. 74–76. London, April 1924.

A weevil received from Kent is identified as *Anthonomus incurvus*, Panz. The nomenclature of this and allied species is discussed. *A. incurvus* was taken in the folds of sacking bands around the main trunks of apple trees placed there as traps for *A. pomorum*, L. (apple blossom weevil). During the summer it was found on the hedges surrounding the orchard and on poplars, but there is no evidence that it normally feeds on the latter. Eggs of this species were never found in the apple blossom buds as is the case with *A. pomorum*. The differences in the genitalia of the two species are described.

Altson (A. M.). **On the Genital System of** *Lyctus brunneus* **Steph. with a Note on** *Lyctus linearis* **Goeze (Coleoptera).**—*Jl. Linn. Soc.*, Zool., xxxv, no. 238, pp. 581–596, 4 figs., 34 pls. London, 16th April 1924.

The contents of this paper are indicated by its title.

Atwood (G. G.). **The Inspection, Certification, and Transportation of Nursery Stock in the United States, New York State, other States and Canada.**—*New York Dept. Farms & Markets*, Circ. 248, 26 pp. [*sine loco*] 1923.

This is a revised summary of the regulations in force that deal with plant quarantine and legislation in the United States and in Canada corrected to September 1923.

[Vereshtchagin (B.)] **Верещагинъ (Б.). [Entomological Notes.]**—**Фурника** [*Furnika*], nos. 9, 10 and 11. [Kishinev] 1st & 15th May and 1st June 1924.

Brief notes are given on the occurrence in Bessarabia of *Bruchus pisorum*, L. (*Laria pisi*, L.), attacking peas, *Homoeosoma nebulella*, Hb., a Pyralid moth infesting sunflowers, and a sawfly, *Neurotoma flaviventris*, Retz. (*Lyda pyri*, Sch.), on pears. These pests are briefly described, with recommendations for their control.

[Nikolski (V.).] **Никольский (В.). Открытие в области биологии саранчевых насекомых** (*Locusta migratoria*, **L.**, *Locustana pardalina*, **Walker.**). [A Discovery in the Bionomics of Locusts.]—**Хлопковое Дело** [*Cotton Indust.*], iii, no. 3–4, pp. 71–78. Moscow, March-April 1924.

A brief account is given of the breeding experiments with *Locustana pardalina*, Walk., made by Faure [*R.A.E.*, A, xi, 507]. In the author's opinion they fully confirm Uvarov's theory of phases [*R.A.E.*, A, ix, 561]. The actual factors of transformation of one phase into another are, however, still obscure and must be of a physiological nature; detailed studies of the physiology of locust larvae are therefore involved.

[Korolkov (D. M.).] **Корольков (Д. М.). Подсолнечная метлица или подсолнечная огневка.** [The Sunflower Moth, *Homoeosoma nebulella*, Hb.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922 года.** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 1–40, 5 figs. Petrograd, 1924.

Homoeosoma nebulella, Hb., causes considerable damage to sunflowers in the Saratov district. Its life-history and seasonal habits are described in full, the results being substantially the same as those already recorded [*R.A.E.*, A, viii, 274].

[Anutchin (A. V.).] **Анучин (А. В.). Обзор вредителей Одесского уезда.** [Review of the Pests of the Odessa District.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922 года** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 41–53. Petrograd, 1924.

This annotated list of insect pests is compiled from observations made in the district of Odessa between July 1916 and January 1918. They are arranged under the orders to which the insects belong and are grouped according to the class of crops attacked.

[Lebedev (A. G.).] **Лебедев (А. Г.). Продолжительность голодания и развития** *Calandra granaria*, **L. при различных температурах и средней влажности.** [Prolonged Starvation and Development of *C. granaria*, L., under varying Temperatures and average Humidity.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922 года** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 54–60. Petrograd, 1924.

These experiments, though by no means indica ing the possible duration of life of *Calandra granaria*, L., under all temperatures in the entire absence of food, show that high temperatures are decidedly noxious to this weevil and that it will survive 30 minutes at the most in a temperature of 50° C. [122° F.].

Development is greatly affected by temperature. The optimum appears to be from 16°–20° C. [60·8°–68° F.]; under these conditions the largest numbers of weevils were obtained, development lasting from 88–110 days.

[Klodnitzki (I. I.).] **Клодницкий (И. И.). Новый род и вид тли из окрестностей Киева.** [A New Genus and Species of Aphid from the Environs of Kiev.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922 года** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 61–63, 1 fig. Petrograd, 1924.

Ctenocallis dobrovljanskyi, gen. et sp. n., is described from the environs of Kiev, where parthenogenetic females were found from June to September on the upper surface of leaves of *Cytisus ratisbonensis*.

[Vasilev (I. V.).] **Васильев (И. В.). К биологии морковных тлей. (Краткий предварительньй доклад.)** [On the Biology of Carrot Aphids. (Short preliminary Statement.)]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 64–69. Petrograd, 1924.

Aphis rumicis, L., is found on many plants, including carrots. Other Aphids recorded as injurious to carrots in Kharkov are *Siphocoryne pastinaceae*, L. (*cicutae*, Koch), which also occurs on many umbelliferous wild plants and causes considerable injury to dill (*Anethum graveolens*); and *Aphis anthrisci*, Kalt., occurring on both wild and cultivated carrots and attacked by the parasite, *Leucopis griseola*, Mg., and the predators, *Coccinella septempunctata*, L., *Adalia bipunctata*, L., *Melithreptus*, *Syrphus* and *Chrysopa*. *A. anthrisci* can withstand severe frosts, and apparently the non-migrating individuals complete the entire cycle of their development on carrots and many weeds. In the field hibernation occurs on these plants, and it can also occur in the egg stage on carrots. *Aphis angelicae*, Koch, attacks the roots of carrots and is also preyed upon by the larvae of *Melithreptus* and *Syrphus*. Towards the end of September when all the winged forms have developed, they completely disappear from carrots and other Umbelliferae, and apparently migrate to horse-radish. *Pemphigus pyriformis*, Licht., also attacks carrots and can apparently pass the winter on the roots of this plant, as well as on those of *Pulicaria prostrata*.

[Dobrodeev (A. I.).] **Добродеев (А. И.). О задачах Рябовской Лесо-Энтомологической Станции.** [The Problems of the Riabovsk Forest Entomological Station.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 70–76. Petrograd, 1924.

The Riabov Forest Entomological Station was opened in 1921 about 13 miles from Petrograd in order to facilitate studies of living forest insects. Those requiring special consideration include *Ips typographus* and *Myelophilus piniperda*. Observations are also being made on *Pityogenes chalcographus*, *P. bidens*, *Ips acuminatus*, *Hylastes palliatus* and *Hylobius abietis*. Eggs of *H. abietis* were found on the roots of pine felled during the latter half of summer, indicating autumn oviposition or that they are laid on the living tree, in which case the larvae also must be considered injurious. Observations on the oviposition of sawflies, showing five types of leaf oviposition, are briefly described.

[Megalov (A. A.).] **Мегалов (А. А.). Из наблюдений над сверчком** (*Gryllus desertus*). [Observations on *G. desertus*.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 96–100. Petrograd, 1924.

An account is given of the abundance of *Gryllus desertus* in Astrakhan and its control during 1922 [*R.A.E.*, A, xii, 23], as well as of the observations made under laboratory conditions regarding the habits

of this cricket. Under such conditions the length of the egg stage averages about 3 weeks, both this and the larval stages being described. The crickets hibernate in the fourth larval stage in any suitable crevice or in prepared underground burrows.

[Vélitchkevitch (A. I.).] **Величкевич (А. И.). Биологические наблюдения над луковой молью (*Acrolepia assectella*, Zell.) в Новгородской губернии.** [Biological Observations on *A. assectella*, Zell., in the Novgorod Government.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 101–107. Petrograd, 1924.

In 1920 and 1921 there was a serious infestation of onions by *Acrolepia assectella*, Zell., in Novgorod. The larvae tunnel in the leaves, causing them to turn yellow and wither. The eggs are laid on the leaves in May and hatch in from 5 to 7 days. The larval stage lasts about 12 to 16 days; pupation occurs on the outside of the leaf and lasts from 9 to 13 days. The habits of the adults are described. During 1921 three generations were observed. Hibernation may occur in the adult or pupal stage. In damp weather larvae that have come out of a leaf for pupation may turn back and pupate inside it. Under such conditions the pupae are better able to withstand the winter. In the field the generations overlap considerably.

Natural enemies include fungous diseases, Staphylinids and Coccinellids.

Cultivation and every means of keeping the plants healthy and resistant are essential remedial measures in the control of *A. assectella*. This may be supplemented by hand collection of pupae, the burning of all attacked leaves in the autumn and the prevention of oviposition by dusting with some substance such as ashes or powdered lime, that recommended being a mixture of 1 part lime to 2 parts soot.

[Fokin (A. D.).] **Фокин (А. Д.). Болезни и повреждения культурных растений, наблюдавшиеся в Вятской губернии летом 1922 г.** [Diseases and Injuries of cultivated Plants observed in the Viatka Government during the Summer of 1922.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 108–115. Petrograd, 1924.

This record of plant pests is arranged under the crops attacked and refers chiefly to those of fungous or bacterial origin.

The animal pests recorded are *Tylenchus allii*, Bey., on onions; *Myzus ribis*, L., on currants; and *Tetraneura ulmi*, DeG., on elm.

[Parfentev (I. A.).] **Парфентьев (И. А.). О невосприимчивости некоторых сортов плодовых деревьев к вредным насекомым.** [On the Immunity of certain Fruit Trees from injurious Insects.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 116–134. Petrograd, 1924.

The apparent immunity and resistance of various varieties of fruit trees to injurious insects is discussed at length. Some of the factors

producing such immunity are type of soil, position, and time of flowering, all of which to a certain extent at least may be controlled by the grower. Observations made in the Crimea with different apple pests are described, illustrating the preference of some insects for certain varieties of trees, whilst others confine their attack to certain types of growth of the tree, regardless of variety.

[Mordvilko (A. K.).] **Мордвилко (А. К.). Кровяная тля** (*Eriosoma lanigerum*, **Hausmann**) **и другие Eriosomea.** [*E. lanigerum*, Hausm., and other Eriosomea.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 149–152. Petrograd, 1924.

This information has already been noticed from another source [*R.A.E.*, A, xi, 563], where it was published in English.

[Mordvilko (A. K.).] **Мордвилко (А. К.). Распространение некоторых групп тлей в связи с их прошлым.** [On the Distribution of some Groups of Aphids in connection with their Past.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 153–157. Petrograd, 1924.

This paper has already been noticed from an English version [*R.A.E.*, A, xi, 564].

[Belski (B. I.).] **Бельский (Б. И.). Список вредителей лекарственных растений, по наблюдениям в окрестностях Киева в 1919-1922 годах.** [List of Pests of Medicinal Plants from Observations made in the Environs of Kiev during 1919–1922.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 158–170. Petrograd, 1924.

The insect pests recorded are arranged under their respective orders and include:—Rhynchota: *Palomena* (*Cimex*) *prasina*, L., causing serious damage to *Carthamus tinctorius* by sucking the ripening seed in August and September; *Syromastes marginatus*, L., on *Rheum palmatum* var. *tanguticum*, which may be destroyed by shaking into a bucket of water with a kerosene film; *Macrosiphoniella* (*Macrosiphum*) *tanacetaria*, Kalt., on *Tanacetum balsamica*, which may be entirely destroyed either by this Aphid or a fungous disease following its attack; *Macrosiphum millefolii*, DeG., on *Achillea millefolium*; *M. tanaceti*, L., on *Tanacetum vulgare*; *Siphocoryne capreae*, F., and *Aphis pimpinellae*, Koch, on *Pimpinella anisum*; *Aphis malvae*, Koch, on *Althaea officinalis*; *A. rumicis*, L., on *Rheum palmatum* var. *tanguticum* and *Valeriana officinalis*; and *A. craccivora*, Koch, and *Myzocallis ononidis*, Kalt., on *Melilotus*. Lepidoptera: *Coleophora saponariella*, Heeg., on *Saponaria officinalis*; *Gelechia malvella*, Hb., on *Althaea officinalis*; *Pandemis heparana*, L., on *Artemisia dracunculus*; *Pyrausta nubilalis*, Hb., on *Humulus lupulus* and *Rheum palmatum* var. *tanguticum*, growing close to maize, though the latter was not attacked; *Carcharodus altheae*, Hb., on *Althaea officinalis*; *Melitaea didyma*, L., on *Artemisia dracunculus*; *Biston zonaria*,

Schiff., on *Salvia officinalis*; *Phytometra* (*Plusia*) *gamma*, L., on *Verbascum phlomoides* and *V. thapsiforme*; *Acronycta rumicis*, L., on *Rheum palmatum* var. *tanguticum*; *Agrotis c-nigrum*, L., and *Euxoa* (*A.*) *segetum*, Schiff., on *Atropa belladonna*; and *Polia* (*Mamestra*) *persicariae*, L., on *Inula helenium*. Coleoptera: *Subcoccinella vigintiquatuorpunctata*, L., on *Saponaria officinalis*; *Crioceris duodecimpunctata*, L., on *Asparagus officinalis*; *Lilioceris lilii*, Scop., on *Lilium martagon*; *Psylliodes dulcamarae*, E. H., on *Solanum dulcamara*; *Cassida murrea*, L., on *Inula helenium*; *Apion validum*, Germ., on *Althaea officinalis*; *Ceuthorrhynchus quadridens*, Panz., on *Sinapis nigra*; and *Rhinoncus pericarpius*, L., the chief pest of *Rheum palmatum* var. *tanguticum*. Diptera: *Pegomyia nigritarsis*, Zett., on *Atropa belladonna*; and *Spilographa alternata*, Fll., on *Rosa rugosa*.

[Mordvilko (A. M.).] **Мордвилко (А. М.). Из истории некоторых групп тлей.** [The History of certain Groups of Aphids.]—**Труды 4-го Всероссийского Энтомо-фитопатологического Съезда в Москве 8-14 декабря 1922** [*Trans. 4th All-Russian Entomo-Phytopath. Meeting, Moscow 8–14th December 1922*], pp. 180–186. Petrograd, 1924.

The history of certain groups of Aphids is traced from fossil times up to the present day, showing the evolution of certain species.

[Plotnikov (V.).] **Плотников (В.). Горный клоп-большой враг земледелия в Туркестане.** [*Dolycoris penicillatus*, Horv., a serious Pest of Agriculture in Turkestan.]—**Бюллетень Народн. Комиссариата Земледелия Туркреспублики** [*Bull. Natnl. Commiss. Agric. Turkestan Republic*], no. 4–5, pp. 101–103. Tashkent, April-May 1924.

The Pentatomid, *Dolycoris penicillatus*, Horv., is a serious pest of many crops in Turkestan, including tomatos and wheat, being particularly injurious to the latter. The damage is caused by the feeding of the adults, chiefly about June. Soon afterwards they disappear and may be found collected in large numbers amongst wormwood [*Artemisia* sp.], from which they are easily dislodged by smoke. The eggs are laid during May on a boraginaceous weed (*Nonnea*), on which the emerging larvae feed.

Froggatt (J. L.). **The Banana Weevil Borer.**—*Queensland Agric. Jl.*, xxi, no. 4, pp. 275–276. Brisbane, April 1924.

Two main breeding periods of the banana weevil borer [*Cosmopolites sordidus*, Germ.] have been observed, in spring and autumn. During the winter the beetles are comatose, and in the summer they are dormant, though breeding continues to a certain extent throughout the year. Under natural conditions the life of the weevil extends considerably over a year; without food, in moist soil, they can live for several months, but this is largely governed by the time of year. Under laboratory conditions the action of various poisons on the adult beetles is markedly more uniform during the active period compared with the inactive one. Paris green in a poison bait seems simpler than the old trapping methods, but whether it is the best poison to use has not yet been completely worked out. All old plant material should be immediately cut up so that it will become dry and unsuitable for

breeding or shelter ; the beetles are then forced into the stools, where they can be more readily destroyed than when scattered throughout a plantation. The question as to whether the beetles can fly still remains unsolved. Both laboratory and field tests carried out by the author failed to show any evidence of flight, but as the beetles avoid light, evidence is not easy to obtain.

JARVIS (E.). **Melolonthid Beetles affecting Sugar Cane.**—*Queensland Agric. Jl.*, xxi, no. 4, pp. 322–324, 1 pl. Brisbane, April 1924.

Melolonthid beetles found in connection with sugar-cane cultivation in Queensland include *Lepidiota frenchi*, Blackb. [*R.A.E.*, A, vi, 295], which is always present, but in excessive numbers only every second year ; *L. consobrina*, Gir., which emerges from the ground about 3 weeks earlier than *L. frenchi*, and is of local occurrence and much rarer in forest country, though the larvae often occur under cane stools and may seriously injure the roots ; *L. grata*, Blackb., which, however, has not been reported as damaging sugar-cane ; *L. rothei*, Blackb., which emerges from forest land about the same time as *L. frenchi*, but has a life-cycle lasting only one year, the larvae often being found under cane ; *L. froggatti*, Macl., rather a rare species, which seldom attacks cane roots, but appears to frequent scrub lands, and is believed to have a two-year life-cycle ; and an unidentified species closely resembling *L. rothei*, but differing in certain respects and having a two-year life-cycle. *L. caudata*, Blackb., appears on the wing in scrub lands about September and is said to be an important pest in some localities ; its larvae are about twice the size of the common greyback beetle [*Lepidoderma albohirtum*, Waterh.] and can inflict serious injury on cane roots. Its life-cycle occupies two years, and it is said to feed on the foliage of Euphorbiaceae. The Dynastid, *Xylotrupes australicus* (elephant beetle), which feeds mostly on vegetable humus, is also occasionally reported as occurring in cane fields.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxi, no. 4, pp. 325–326. Brisbane, April 1924.

Climatic conditions early in 1924 were very favourable to the greyback cockchafer (*Lepidoderma albohirtum*, Waterh.), and larvae are expected to be abundant, although about 50 per cent. of the beetles perished in the previous year owing to a long spell of dry weather. Experiments are being carried out to determine the minimum amount of paradichlorobenzene required per acre to kill the first and second stage grubs. It is hoped that this may be done by injections of $\frac{1}{16}$ oz., placed 12 in. apart and $4\frac{1}{2}$ in. deep. A specially-designed machine has been tried for treating large areas with paradichlorobenzene ; with this it was possible to bury uniform quantities of the fumigant about 2 in. deep and 15 in. apart, and one man and one horse were able to treat from 3 to 4 acres daily.

Calcium cyanide promises well as a remedy ; in laboratory experiments 8 grains were sufficient to kill first-stage grubs of *L. albohirtum* and third-stage grubs of *Lepidiota frenchi* in less than 12 hours, when sprinkled about 2 in. above the level at which they are feeding and then covered over by about 2 in. of soil. The cages used were $4 \times 3\frac{1}{2}$ in. in size, open at the top. It has yet to be determined what distance

hydrocyanic acid gas will travel vertically and horizontally on each side of 8 to 15 gr. injections, and what effect it may have on growing roots of cane. If the machine referred to were used for injecting this poison, the danger would be reduced to a minimum.

Bodenheimer (F. S.). **Observations about some Scale-insects from El-Arish (Sinai) and Transjordania.**—*Bull. Soc. R. ent. Egypte,* xvi (1923), pp. 121–124. Cairo, 1924.

The Coccids recorded from El-Arish (Sinai) are, *Asterolecanium pustulans* var. *sambuci,* Ckll., very abundant on edible fig (*Ficus carica*) producing deformations of the twigs; *Phoenicococcus* (*Sphaerococcus*) *marlatti,* Ckll., widely distributed on the leaf-stalks of date palms, but not causing any recognisable damage; *Adiscodiaspis tamaricicola,* Malen., fairly common on old *Tamarix* trees; *Aspidiotus lataniae,* Sign., on *Thymelaea hirsuta*; *Targionia nigra,* Sign., on a desert shrub; *Lepidosaphes ficus,* Sign. (*conchiformis,* Gmel.), abundant on *F. carica*; *L. ulmi,* L., on *Salix*; and *Parlatoria blanchardi,* Targ., fairly common on date palms, but apparently causing no damage.

Those from Transjordania are *Pollinia pollini,* Costa, on *Olea europea*; *Phoenicococcus* (*Sphaerococcus*) *marlatti,* Ckll., on date palms; *Ceroplastes rusci,* L., on *F. carica*; *Aspidiotus britannicus,* Newst., on *O. europaea*; *Chionaspis berlesei,* Leon., on wild *Asparagus*; *C. herbae,* Green, on *Bambusa* and other grasses; *Crypthemichionaspis africana,* Newst., on *Salix*; *Lepidosaphes minima,* Newst., on *F. carica*; and *Aspidiotus hederae,* Vall. (*Parlatoria oleae,* Colv.), widely distributed on plum, pear and apple.

Buxton (P. A.) & Uvarov (B. P.). **A Contribution to our Knowledge of Orthoptera of Palestine.**—*Bull. Soc. R. ent. Egypte,* xvi (1923), pp. 167–214, 5 figs. Cairo, 1924.

Notes are given on Orthoptera collected in Palestine during 1921-23, including a number of species not previously recorded from that country. New species described by Uvarov include: *Dociostaurus cephalotes, Sphingonotus coerulans theodori,* subsp. n., and *S. hierichonicus.* A review of the literature on the fauna is appended.

Horvath (G.). **Description d'un Fulgoride nouveau des dattiers (Hémipt.).**—*Bull. Soc. R. ent. Egypte,* xvii, no. 1, pp. 91–93. Cairo, 1924.

Asarcopus palmarum, gen. et sp. n., is described from *Phoenix dactylifera* in Cairo.

Miller (D.). **The "Turnip-fly" and its Associates.**—*N. Z. Jl. Agric.,* xxviii, no. 4, pp. 239–247, 16 figs. Wellington, 21st April 1924.

Turnips in New Zealand are very severely damaged by *Odontria zealandica,* White (grass-grub beetle), which is also a serious pest of rape and injures the foliage of orchard trees, willows, etc. Most of the loss amongst turnips occurs during November and early December, when they are in their first leaf, the attack being practically confined to the parts of the plant above ground, either the whole crop being destroyed or large patches being eaten out over the whole area. The

beetles feed at night, and in the daytime hide among the dense foliage of surrounding plants or burrow into the ground; they are most active on dull, mild and calm evenings. The eggs are laid in the ground, usually on land well stocked with roots, such as pasture, or in turnip or rape fields, the larvae devouring the tender roots (this damage being prevalent from December to March). During the winter, hibernation occurs in a shelter in the earth, and activity recommences at the surface during August, when the grubs become full-grown. By October, practically all have descended into the earth again, where pupation occurs, the adult beetles beginning to emerge by the end of October.

To avoid damage, crops should be sown so that none will be in the seed-leaf stage when the beetle is on the wing. Crops sown in October are sufficiently advanced to escape serious injury during the main destructive period. From the last week in December they can also be started with safety. Roughly cultivated land provides good shelter for the beetles; late winter and early spring cultivation exposes many mature grubs on the surface, where they are frequently destroyed by birds. As an accessory measure, fires lighted at night will attract many beetles. The grass-grub is comparatively free from insect enemies, though the Asilid flies, *Itamus varius* and *Saropogon antipodus*, are predacious on it.

The cutworms, *Agrotis ypsilon* and *Ariathisa coma*, are also pests of seedling turnips, especially in the vicinity of hedgerows and coarse grass. The spring generations damage the foliage of young plants, while the second or third generation often ring-barks the roots just above the soil surface. Autumn cultivation is very useful in destroying the pupae. The cutworms are parasitised by a Tachinid, *Phorocera marginata*, and birds, especially starlings, destroy many of them. *Plutella maculipennis* (*cruciferarum*) (diamond-back moth) and *Brevicoryne brassicae* (cabbage aphis) are two other serious pests of cruciferous crops that are being studied.

NEWMAN (L. J.). **Woolly-aphis Parasite,** *Aphelinus mali*, **Hald.**—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 1, pp. 40–44, 3 figs. Perth, April 1924.

The successful introduction of *Aphelinus mali*, Hald., from New Zealand into Western Australia against *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm. (woolly apple aphis) is recorded. Though other natural enemies are present and are valuable assistants in control, the effect of introducing the Chalcid has been remarkable, although it must be carried through the winter before its value is definitely proved. At present there is every prospect of its becoming established in all the apple-growing districts of the State. Instructions for the introduction of a colony are given, and also for the distribution of parasitised material from one part of the State to another. The number of generations that will be produced annually in Western Australia is not yet known.

A note from New Zealand records the fact that *A. mali* has been observed there to parasitise the black aphis of lemon [*Toxoptera aurantii*, Boy.], young mealybugs [*Pseudococcus*] and the common oyster-shell scale [*Lepidosaphes ulmi*, L.], though it will not attack the more mature mealybugs.

Newman (L. J.). **Protection of useful Insects, Birds and Animals.**—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 1, pp. 45–47. Perth, April 1924.

The upsetting of the balance of nature in Western Australia by cultivation of fresh land and its effect upon the problem of insect control are explained. Many insects have in consequence changed their native food for an introduced one ; for example, the Melolonthid beetle, *Colymbomorpha lineata*, formerly lived on native blossoms, but now attacks the blossoms and fruit of many orchard trees, causing considerable loss in some years. Birds are considered a most important and efficient check on insect multiplication, and the advantage of affording protection to useful insects, birds and animals is pointed out.

Corbett (G. H.) & Yusope (M.). *Scotinophara coarctata*, **F. (the Black Bug of Padi).**—*Malayan Agric. Jl.*, xii, no. 4, pp. 91–106, 1 pl. Kuala Lumpur, April 1924.

Besides *Leptocorisa* spp., which suck the sap from the developing grain, and *Nephotettix bipunctatus*, F., which sucks the leaves and stems, sometimes causing considerable damage, the Pentatomid, *Scotinophara* (*Podops*) *coarctata*, F., is a serious pest of rice in Malaya. It is believed to live normally on grasses in the jungle, and attacks rice by sucking the sap from the stems so that no grain is formed. In 1918, when the first serious depredations were noticed, large areas of rice were destroyed by this bug. Its distribution and history in Malaya are discussed, and its stages are described. The eggs are laid in groups, generally of about 40, and under dry conditions are frequently at the base of the plant or in cracks of soil or on the roots ; in flooded areas they are laid on the lower leaves or further up the stem. It was found in the insectary that a certain degree of moisture was necessary for hatching of the egg, and this probably accounts for the place of oviposition. The eggs hatch in 4–7 days. The pre-oviposition period varies from 9 to 22 days, and as many as 684 eggs were laid by one female. The average period from hatching of the egg to appearance of the adult is 32 days, and the maximum life of the adult is about 214 days. Under dry conditions the nymphs and adults are forced to descend below ground to the roots to obtain moisture. Both nymphs and adults seem to be free from natural enemies, but the eggs are parasitised to an average extent of about 55 per cent. by an unidentified Chalcid, which completes its development in the egg.

The land should be cleaned up as thoroughly as possible after harvesting the crop, the stubble should be burnt and the banks kept clear of weeds. Collections should be made of all stages from the nursery beds ; these are frequently found high on the plants in the early morning, when hand nets can be successfully used. Where flooding is possible, nymphs and adults can be collected on the surface of the water [*R.A.E.*, A, xi, 440]. Although the adults are occasionally attracted to lights, these cannot be recommended as traps. Sprays of kerosene emulsion and of derris both have a marked killing effect, but unless the latter is grown by the cultivator, its cost is too great.

Duboscq (O.) & Grassé (P.). **Notes sur les Protistes parasites des Termites de France. Sur l'évolution de** *Janickiella grassii*, **Dub. et Gras.**—*C. R. Soc. Biol.*, xc, no. 19, pp. 1442–1445, 10 figs. Paris, 6th June 1924.

The author makes some attempt to classify the flagellates living in termites and considers that those previously provisionally placed in the genus *Trimitus* are probably only the young stages of *Janickiella*.

Rohwer (S. A.). **Notes on and Descriptions of some Sawflies from Japan (Hym.).**—*Jl. Wash. Acad. Sci.*, xiv, no. 10, pp. 213–215. Washington, D.C., 19th May 1924.

The new sawflies described from Japan include *Tomostethus juncivorus*, feeding upon a cultivated species of *Juncus*, and *Hoplocampa pyricola* from pear fruits. *Eriocampoides matsumotonis*, Haruk., recorded as feeding on leaves of pear, peach and other species of *Prunus* in Japan, is redescribed.

Spray Calendars for Apples and Quinces, Peaches, Pears, Plums and Cherries, and Grapes.—*New Jersey Agric. Expt. Sta.*, Circs. 162–166, 4, 4, 4, 4 & 3 pp., 9 figs. New Brunswick, N.J., 15th February 1924.

These are the latest spray schedules for New Jersey and supersede those previously noticed.

Headlee (T. J.). **Tentative Plan for Combating the Oriental Peach Moth.**—*New Jersey Agric. Expt. Sta.*, Circ. 167, 6 figs. New Brunswick, N.J., 5th March 1924.

This schedule of treatments for the oriental peach moth [*Cydia molesta*, Busck] is based upon life-history studies made principally in Virginia and New Jersey. Treatments for both the dormant and growing season are described, and a warning is issued not to apply them later than 14 days (or in some cases 18 days) before harvesting.

Spray to Prevent the Attack of Japanese Beetle.—*New Jersey Agric. Expt. Sta.*, Circ. 168, 4 pp., 3 figs. New Brunswick, N.J., 5th March 1924.

Instructions are given for suitable materials and times for spraying apples, peaches, cherries and grapes against the Japanese beetle [*Popillia japonica*, Newm.], the life-cycle of which is illustrated in diagrams.

Peterson (A.). **The Peach Tree Borer in New Jersey (with Notes on similar Pests).**—*New Jersey Agric. Expt. Sta.*, Bull. 391, 143 pp., 9 pls. New Brunswick, N.J., 1st August 1923. [Received 17th June 1924.]

A very extensive account is given of *Aegeria* (*Sanninoidea*) *exitiosa*, Say, and of the investigations respecting it carried out in New Jersey during the last six years. Of the many remedial measures tested the only ones that have given any satisfaction have been extraction of the larvae and the use of paradichlorobenzene [*R. A. E.*, A, xi, 17 ; xii, 46,

etc.]. An egg parasite, *Telenomus quaintancei*, Gir., appears to be the most abundant natural enemy of this moth in New Jersey. Cherry and plum trees infested with *A. exitiosa*, and in some cases with *Euzophera semifuneralis*, Wlk. (American plum borer), were similarly treated with paradichlorobenzene, and the results were successful with trees of 6 to 8 years or older, the peach-tree borers being killed and also the plum borers when located near the base of the trees. Further tests are needed to determine the limits of the use of this chemical on young cherry and plum trees, but the indications are that it may be used on most stone-fruits with the same degree of safety as on peaches. Tests against *Saperda candida*, F. (round-headed apple-tree borer) on apples and *Pennisetia* (*Bembecia*) *marginata*, Harr. (blackberry crown borer) on blackberry bushes, confirm the conviction that paradichlorobenzene should not be used in these cases.

CATHCART (C. S.), WILLIS (R. L.) & SMITH (L. R.). **Analysis of Materials sold as Insecticides and Fungicides during 1923.**—*New Jersey Agric. Expt. Sta.*, Bull. 392, 18 pp. New Brunswick, N.J., October 1923.

The results are recorded of the inspection and analysis of various materials used in some 291 brands of insecticides and fungicides.

MARCOVITCH (S.). **Report of the Assistant Entomologist.**—*35th Ann. Rept. Tennessee Agric. Expt. Sta., 1922*, pp. 13–14, Knoxville, Tenn., 1923. [Received 17th June 1924.]

Experiments to determine the effect of light on the strawberry root aphis [*Aphis forbesi*] are recorded [*R. A. E.*, A, xii, 118]. The eggs of this Aphid hatch from about 15th February to 1st March. From March to October no eggs are laid, but the production of living young takes place without the presence of males. In October, sexuales appear. It has generally been considered that the lower temperatures of autumn caused the production of sexuales, but by subjecting the Aphids to a 7-hour day during June, July and August, sexuales appeared in early September—about 6 weeks earlier than the normal. Experiments are now being undertaken to determine whether length of day may be the causative agent of migration.

The ravages of the strawberry crown borer [*Tyloderma fragariae*] are increasing; as, however, the insect cannot fly, by the use of clean plants, and by planting new fields at a distance of 300 feet or more from old ones, injury can be entirely avoided. Observations on the strawberry weevil [*Anthonomus signatus*] indicate that this pest is most destructive when spring begins early, as in 1921. The weevils generally appear as soon as the plants begin flowering and apple trees show pink buds, so that dusting with sulphur and lead arsenate should begin at that time. As the weevils hibernate in woods and thickets, strawberry beds should not be located next to them.

DOWNES (W.). **The Strawberry-root Weevil** (*Brachyrhinus ovatus*, **Linn.**).—*British Columbia Dept. Agric.*, New Hortic. Ser. Circ. 33, 10 pp., 5 figs. Victoria, B.C., 1924.

The bulk of this information regarding *Otiorrhynchus* (*Brachyrhinus*) *ovatus*, L. (strawberry root weevil) has already been noticed [*R. A. E.*, A, x, 459; xi, 501].

Snyder (T. E.). U.S. Bur. Ent. **Descriptions of New Species and hitherto unknown Castes of Termites from America and Hawaii.**—*Proc. U.S. Nat. Mus.*, lxiv, art. 6, no. 2496, 40 pp., 5 pls. Washington, D.C., 1924.

Among the new species described *Nasutitermes* (*Subulitermes*) *zeteki*, sp. n., is recorded from the trunk and petiole of an oil palm, *Elaeis melanococca*, from Panama.

Knight (H. H.). *Atractotomus mali* (**Meyer**) **found in Nova Scotia** (**Heteroptera, Miridae**).—*Bull. Brooklyn Ent. Soc.*, xix, no. 3, p. 65. Brooklyn, N.Y., June 1924.

Atractotomus mali, Meyer, is recorded for the first time from North America, where it is predacious on the green apple Aphid [*Aphis pomi*]. It is known to feed on small Lepidopterous larvae found on apple trees, but apparently there are no previous records of it attacking Aphids. It is possible that this Capsid has been introduced from Europe in nursery stock, as it is rather closely associated with apple trees and hibernates in the egg stage on the twigs.

Chittenden (F. H.). U.S. Bur. Ent. **The Parsley Weevil** (*Listronotus latiusculus*, **Boh.**), **a Potential Pest.**—*Bull. Brooklyn Ent. Soc.*, xix, no. 3, pp. 84–86, 1 fig. Brooklyn, N.Y., June 1924.

In July 1923 larvae of *Listronotus latiusculus*, Boh., were found infesting carrots in New York. Some larvae found on the 18th July matured as early as the 28th July, the last one entering the earth on 6th August and pupating about 8th August. In 1916 this species was abundant on parsley. Attack is principally on the upper part of the head of the carrot, but in small plants may extend well down to the root. Small carrots are also apt to be stunted and rendered useless for any purpose except as food for pigs. The only feasible remedial measure is crop rotation.

Davis (J. J.). **Relation of Insects to Human Life and to the Sciences.**—*Proc. Indiana Acad. Sci.*, xxxiii (1923), pp. 287–297. Lafayette, Ind., 1924.

The importance of insects in the economic life of man is discussed, and the means taken to limit their depredations are reviewed, the progress of insecticidal work being traced. The relations between entomology and all brances of agricultural science are expressed on a chart. The work of the entomologist is divided under the headings of teaching, extension work, investigation and research, and regulatory. The species of insects attacking cultivated crops will undoubtedly be more numerous in the future. Insecticides are the chief method of direct control, but research is required to find cheaper and more effective materials and methods of using them. The cultivation of resistant varieties of plants is likely to be an important feature of insect control, but farm management and biological methods are also two most important factors that need further development.

Smith (G. A.). **Report of the Superintendent of Moth Work.**— *Ann. Rept. Massachusetts Commiss. Conserv. & State Forester, 1923,* pp. 19–20. Boston, Mass. [1924.] [Received 19th June 1924.]

Infestations of the gipsy moth [*Porthetria dispar*, L.] and brown-tail moth [*Nygmia phaeorrhoea*, Don.] were less severe in Massachusetts in 1923 than in former years. The importance of scouting operations in autumn, which can be done so much more efficiently and cheaply than after snow has fallen, is strongly urged. The special treatment given to shade trees on the highways and to woodlands is described.

Burgess (A. F.). **Federal Gipsy Moth Work in Massachusetts.**— *Ann. Rept. Massachusetts Commiss. Conserv. & State Forester, 1923,* pp. 20–21. Boston, Mass. [1924.] [Received 19th June 1924.]

A search for parasites of the gipsy moth [*Porthetria dispar*, L.] in Europe is described, [*R.A.E.*, A, xii, 171]. Several large shipments of Tachinids were sent to Massachusetts from Hungary, and are now in hibernation ; it is thought that at least one species will make a valuable addition to the imported enemies of this pest. The brown-tail moth [*Nygmia phaeorrhoea*, Don.] has not been seriously abundant except in limited areas, indicating a high mortality due to imported parasites.

The Control of the Oleander Scale. — *Agric. Bull. Bermuda Dept. Agric.*, ii, no. 9, p. 2. St. George, September 1923. [Received 23rd June 1924.]

The spread of *Diaspis* (*Aulacaspis*) *pentagona* in Bermuda has been checked by natural enemies imported from Italy. At least two of the parasites have become established, but have not yet been determined.

Soursac (L.). **Observations sur l'Opatre des sables.**—*Progrès agric. & vitic.*, lxxxi, no. 25, pp. 598–599. Montpellier, 22nd June 1924.

Opatrum sabulosum has been previously known as a pest of young vine grafts that are still earthed up, of which it eats the growing buds.

In certain districts in the South of France, especially those swept by north winds, the vines are trained very low, while the earth under them is kept in constant light cultivation. Such soil is very favourable to this beetle, and the cultivation prevents weeds from growing, so that there is no other food. Under these circumstances *O. sabulosum* occurs in large numbers and is evidently the cause of the entire loss of leaf-buds on many of the lower shoots, and of the terminal leaves of the lower branches. It is suggested that the vine-stock should be thoroughly cleaned and laid bare for a good depth, hollowing out the earth around it, this treatment being maintained through late April and early May.

Verron (G.). **Nouveau piège contre l'Eudémis.**— *Jl. Agric. prat.*, xli, no. 25, pp. 493–494. Paris, 21st June 1924.

A new kind of trap for use against the vine moth [*Polychrosis botrana*, Schiff.] is described by a vine-grower of Beaujolais, who has used it for several years with excellent results. It consists of a piece of thick window-glass about 1 ft. square, held in a horizontal position on an iron stand. This sheet of glass is painted on the lower surface with

red ochre with a brush dipped in linseed oil. When put in position among the vines, the upper surface of the glass is painted with colza oil. The red colour seen through the glass, which reflects light in the dusk, attracts the moths on to the colza oil, where they are caught. Red was chosen because it proved more attractive to the moths than any other colour, and colza oil gave the best result as an adhesive, but it must be of good quality and fresh. Eight traps per acre are sufficient. For the first generation, the traps should be placed very low, below the lowest vine shoots ; for the second and third generations, at the average height of the fruit clusters. During the flight season of the moths, the traps should be visited each day and the colza oil scraped with a knife to remove all dead moths, débris, etc., and renewed if necessary in the afternoon, just before the evening flight. The traps should be cleaned when the season is over by powdering the two sides with wood ash, sand, or sawdust, and wiping the red paint off with a dry cloth.

PATTERSON (W. H.). **Report of the Entomologist.**—*Gold Coast: Rept. Agric. Dept., January 1922–March 1923,* pp. 21–22. Accra, 1923. [Received 24th June 1924.]

The chief causes of the increase of the cacao thrips, *Heliothrips rubrocinctus,* Giard, have been errors of cultivation, excessive removal of forest trees and lack of shade for the crop. It is very rare for this pest to damage healthy cacao. Guava fruit at Aburi has also been seriously affected by this thrips.

Some preliminary work was done with the pests of stored cacao, the chief points brought out being the necessity for properly constructed clean stores, and for thorough drying of the product. The larva of a Noctuid was reported as feeding on the bark of cacao trees and on the stems of other plants, including palms. A similar larva feeds upon the staminate flowers of the oil palm.

A fungus found several years previously, attacking both larvae and adults of the cola weevil, *Balanogastris colae,* Desbr., proves to be *Botrytis bassiana,* not previously recorded from the Gold Coast. As an effective control for the cola weevil this fungus is of little use, since the weevils are able to oviposit before death occurs. On one estate, the collection and burning of fallen nuts and the fumigation with potassium cyanide of nuts to be sold is reported to be effective in reducing damage.

The fruit moths, *Othreis* (*Ophideres*) *fullonica,* L., and *Achaea* spp., were very numerous in March and April, but the food-plants of the caterpillars have not been ascertained.

The Hispid beetle, *Coelaenomenodera elaeidis,* Maul., is apparently on the increase on oil palms in the Aburi district.

FRIEDERICHS (K.). **Verslag van den Entomoloog over het jaar, 1923.** [Entomologist's Report for 1923.]—*Meded. Koffiebessenboeboek-Fonds,* no. 10, pp. 241–247. Soerabaya, April 1924. [Received 17th June 1924.]

The investigations on the value of various insecticides against *Stephanoderes hampei,* Ferr., have been noticed [*R.A.E.,* A, xii, 201]. No further work was done with the fungus infesting this beetle [xi, 354] and no living specimens of the parasite from Uganda [xii, 200] were received. It was conclusively proved that late harvesting of the

coffee berries is highly favourable to the increase of the borer. The use of boiling water or steam for disinfecting the berries [xi, 354] has not yet been generally applied, but has given excellent results on some estates. Complaints as to a depreciation of quality will not occur if the berries are not left in the water for more than 1½ minutes ; a longer immersion may result in the beans turning white.

HOEDT (T. G. E.). **De stoomladder.** [The Steam Ladder.]—*Meded. Koffiebessenboeboek-Fonds,* no. 10, pp. 248–258, 4 figs. Soerabaya, April 1924. [Received 17th June 1924.]

This apparatus has given excellent results in destroying the coffee berry borer, *Stephanoderes hampei,* Ferr., in harvested berries. It consists of a hollow column, square in section, about 12 ft. high and with sides of about 1 ft. One of these sides is hinged to open like a door, thus giving access to the interior for cleaning. Two of the opposite sides are fitted with baffle plates slanting downwards at an angle of 45 degrees. A hopper is fixed above the hollow column and receives the berries, which pass out through a slot at the bottom, the width of which is adjustable to regulate the flow of berries. Steam is led in at the bottom of the tube and acts on the berries as they roll on each plate and fall on to the one beneath until they reach the bottom and are caught in containers or in a stream of water that carries them to the pulper. It is suggested that by increasing the width of the sides and by decreasing the slope of the plates, the period of exposure to steam can be retained with a column of reduced height. In a shorter tube the steam would be of nearly the same temperature at the outlet as at its point of entrance.

WÜLKER (G.). **Die Kiefer und ihre Feinde.** [The Pine and its Enemies.] —*Ber. Senckenberg. Naturf. Ges.,* liv, no. 1, pp. 1–20, 8 figs. Frankfurt a/M., 1924.

This is an account of the various pests that attack the pine in Germany at different stages of its life.

The roots of seedlings are bitten off by mole-crickets, *Gryllotalpa* (*Curtilla*) *gryllotalpa.* Two-year old plants are attacked by the larvae of *Melolontha melolontha* (*vulgaris*), *M. hippocastani* and wireworms. All these injure the roots, which together with the stems and foliage, are attacked by the caterpillars of *Agrotis vestigialis* and *Euxoa* (*Agrotis*) *segetum.* Between 2 and 5 years the bark is attacked by *Hylobius abietis,* while other weevils, of the genera *Strophosomus, Cneorrhinus* and *Metallites,* feed on the buds, shoots and needles. The adults of *Polyphylla fullo* injure the needles, and the larvae, the roots. A few years later the pine is defoliated—and sometimes barked—by sawflies, especially *Diprion* (*Lophyrus*) *pini.*

The bark and roots of trees up to 10 years of age are destroyed by the adults of *Hylastes ater.* At that age and after, the larvae of the weevils, *Pissodes notatus, P. pini* and *P. piniphilus,* mine the living wood of such trees as have been weakened through other causes. The Scolytids, *Myelophilus piniperda* and *M. minor,* and the Buprestids, *Chrysobothris solieri* and *Anthaxia quadripunctata,* also attack sickly trees. A Tortricid, *Rhyacionia* (*Evetria*) *buoliana,* attacks young pines in plantations, while *R.* (*E.*) *resinella* usually infests older trees.

The following moths are especially pests of stands including trees

40 years old or more: *Panolis flammea* (*griseovariegata*), *Dendrolimus pini* and *Bupalus piniarius*. *Hyloicus pinastri* is of slight importance, but the nun moth, *Liparis* (*Lymantria*) *monacha*, may be occasionally dangerous to young pines. *Cnethocampa* (*Thaumetopoea*) *pinivora* feeds on the needles, but does not destroy the infested trees. Stands of trees 40–100 years of age are invaded by a sawfly, *Acantholyda* (*Lyda*) *stellata*.

Several other less important pests are enumerated.

Entomologie.—*C. R. Trav. Soc. Agric. France*, lv, pp. 157–159. Paris, 1924.

An account is given of the appearance of the Colorado potato beetle (*Leptinotarsa decemlineata*, Say) in France and of the steps that have been taken with a view to its extermination. The value of *Aphelinus mali*, Hald., the parasite of the woolly aphis [*Eriosoma lanigerum*, Hausm.] is discussed. It is considered that its importance is being proved every year, but in order to obtain definitely successful results a certain number of apple-growers in each region must be willing to establish a dissemination centre in their orchards. The slight cost and trouble involved in this work is explained.

Smits van Burgst (C. A. L.). **Een afdoend middel tegen beschadiging van wollen stoffen en pelterijen door motlarven.** [A satisfactory Protector of Woollen Cloths and Furs against the Larvae of the Clothes Moth.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 135, pp. 238–240. The Hague, 1st January 1924. [Received 23rd June 1924.]

This article calls attention to the discovery of hexachlorethane ($C_2 Cl_6$) as an efficient destroyer of all stages of the clothes moth [*R. A. E.*, A, xii, 297].

Smits van Burgst (C. A. L.). **Iets over immuniteit bij Insekten tegen infectie door parasitaire klassegenooten.** [A Note on Immunity in Insects from Parasitisation by other Insects.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 135, p. 240. The Hague, 1st January 1924. [Received 23rd June 1924.]

Towards the end of the recent outbreak of the nun-moth, *Liparis monacha*, in Holland it was noticed that while flies were parasitising most of the caterpillars, they failed to develop in their hosts, which pupated and gave rise to healthy moths. A similar case has been observed in *Samia cecropia*, L. [*R. A. E.*, A, xi, 116].

Kuyper (J.). **Het optreden van strepenziekte in den West-moesson van 1923-1924.** [The Occurrence of Sugar-cane Mosaic Disease during the West Monsoon of 1923–1924.]—*Arch. Suikerind. Ned.-Indië, Meded. Proefst. Java Suikerind.*, 1924, no. 5, pp. 141–150. Pasoeroean, May 1924.

Many of the observations made confirm those of others workers that *Aphis maidis* (*adusta*) is a vector of sugar-cane mosaic [*R. A. E.*, A, ix, 90, 288], though it is doubtful whether it is the sole agent.

Flint (W. P.) & Balduf (W. V.). **Calcium Cyanide for Chinch-bug Control.**—*Illinois Agric. Expt. Sta.*, Bull. 249, pp. 73–84, 5 figs. Urbana, Ill., May 1924.

Experiments have been continued with calcium cyanide as a remedy for the chinch-bug [*Blissus leucopterus*, Say] [*R. A. E.*, A, xi, 415]. The best results were obtained by placing 6-in. strips of the cyanide (using about 1 oz. to the strip) at right-angles to a creosote barrier every 2 rods ; this, under favourable conditions, killed 75 to 95 per cent. of the bugs as they moved along the line of the barrier. The cyanide was also very effective when dusted along the line of such a barrier. Fairly good results were obtained by dusting calcium cyanide in trap strips of crops sown between fields of small grain and maize, but this has only been tried for one year.

Flint (W. P.), Hackleman (J. C.) & Bauer (F. C.). **Begin to fight the Corn Borer now.**—*Illinois Agric. Expt. Sta.*, Circ. 274, 8 pp., 5 figs. Urbana, Ill., November 1923. [Received 26th June 1924.]

This information regarding the European corn borer [*Pyrausta nubilalis*, Hb.] has been previously noticed [*R. A. E.*, A, x, 207]. Warnings are issued to watch for the appearance of this pest in Illinois.

Hadley (C. H.). **Report on Japanese Beetle Work.**—*8th Ann. Rept. New Jersey Dept. Agric.*, Bull. 37, pp. 49–52. Trenton, N.J., September 1923. [Received 26th June 1924.]

In spite of thorough inspection and the enforcement of quarantine regulations, the Japanese beetle [*Popillia japonica*, Newm.] continues to spread in New Jersey, having covered a further 500 sq. miles in the course of 1922. Unfortunately, common farm practices are favourable to the insect and there is no practicable modification of them that can be recommended. Colonies of several species of parasites have been introduced from Japan, Korea and Hawaii, though with what success is not yet known. There are certain native parasites, the value of which is being investigated, but it is not thought that they will ever be sufficient in themselves to control the beetle. Experiments are also being made with fungous diseases, including a species of *Isaria* from France, and these show some promise of success. Other lines being worked out include the possibilities of arsenical sprays (many other materials and combinations having been tried without much success) and the effect of weather conditions on sprayed foliage. The use of lead arsenate worked thoroughly into the soil in which nursery stock may be heeled has been tried with very satisfactory results. On grass lands, golf-greens and lawns, a method of using carbon bisulphide has been devised that kills from 60 to 75 per cent. of the grubs, but this requires further experiment before it can be generally recommended.

The Gipsy Moth.—*8th Ann. Rept. New Jersey Dept. Agric.*, Bull. 37, pp. 47–49. Trenton, N.J., September 1923. [Received 26th June 1924.]

The infestation of gipsy moth [*Porthetria dispar*, L.] in New Jersey is reported as much smaller than that of the previous year, being practically confined to one county. It has also been possible to lift the quarantine with regard to nursery stock.

Weiss (H. B.). **Results of the Third Year's Work against the Gipsy Moth in New Jersey.**—*New Jersey Dept. Agric.*, Circ. 67, 23 pp., 20 figs. Trenton, N.J., August 1923. [Received 26th June 1924.]

A detailed account is given of the situation with regard to the gipsy moth [*Porthetria dispar*, L.] in New Jersey and of the work in connection with it.

Ellis (E. T.). **Insect Pests.**—Cr. 8vo, 156 pp. London, George Allen & Unwin Ltd., 1924. Price 3*s.* 6*d.* net.

This book deals concisely and in a popular manner with the principal insect pests of flowers, fruit, vegetables and forest trees in Britain, with recommendations for simple remedies. Sufficient description of the insects for purposes of identification is given, but life-histories have not been attempted. An index to the insects dealt with is appended, as well as a list of notifiable pests scheduled under the Destructive Insects and Pests Act by the Ministry of Agriculture.

Rennie (J.). **The Control of Acarine Disease.**—*Bee World*, vi, no. 1, pp. 7–11. Benson, Oxon, June 1924.

The important fact that acarine disease as regards the individual bee is without remedy is frequently overlooked, but, this being the case, every effort must be directed towards saving healthy bees, replacing losses sustained and preventing fresh introductions of the mites [*Acarapis woodi*] causing the disease. The practical impossibility of killing the mites within the bee by ordinary insecticides is recognised, but it is possible to attack them when migrating on the exterior of the bees by fumigation with sulphur or sulphur and nitre or by dusting with pea flour [*R.A.E.*, A, xii, 143]. Wet sprays are not recommended.

It is thought highly probable that the attraction of the mite to the particular pair of spiracles that it enters is chemotropic in nature, the mite responding to an odorous substance associated with, or emitted by, those organs. Such an odour would be air-borne, and is possibly carbon dioxide (which may not be odourless to the mite). Experiments have therefore been tried of introducing into a hive such a combination of substances in suitable doses as will neutralise or otherwise affect the character of the chemotropic vapour. When this is done successfully, the migrant loses its way, its further development is prevented, and the continual use of the treatment results in checking the infestation. Small doses of aromatic substances, especially such as have in addition a positive acaricidal effect, have proved to be definitely useful and remain effective for a longer time than the fumigation referred to.

In view of the fact that the mite cannot travel by itself from one hive to another, eradication is certainly possible in particular areas, but efforts in this direction are nullified so long as fresh importations of bees from other areas go on without inspection as to their freedom from disease. The legislation passed in other countries to guard against such dissemination of the disease is quoted, and beekeepers in Britain are urged to do what they can to check the indiscriminate dispersal of bees that may be harbouring the mite.

Modification of Pink Bollworm Quarantine. Amendment No. 3 to Second Revision of Regulations Supplemental to Notice of Quarantine No. 52.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 3 pp. Washington, D.C., 5th April 1924.

These regulations regarding the interstate movement of cotton and cotton products directed against the pink bollworm [*Platyedra gossypiella*, Saund.], and effective as from 5th April 1924, are a revision of previous ones [*R.A.E.*, A, xii, 30, 330], which they supersede.

Sherwood (E. C.). **Raising the Community Score by Controlling Insects and Fungous Disease.**—*W. Virginia Coll. Agric.*, Extens. Circ. 269, 20 pp., 2 figs. Morgantown, W.Va., March 1923. [Received 24th June 1924.]

This circular gives a programme of remedial measures against the common fungous diseases and insect pests in garden, fruit and field crops, found in West Virginia.

Peairs (L. M.) & Sherwood (E. C.). **Orchard Spraying.**—*W. Virginia Agric. Expt. Sta.*, Circ. 36, 20 pp. Morgantown, W.Va., March 1924.

This is a summary of the latest recommendations against orchard pests and diseases. Instructions are given for the preparation of the common insecticides and fungicides, and spray schedules for apples, peaches, plums and cherries are included.

[Hutson (J. C.).] **Ceylon Entomology.**—*Trop. Agriculturist*, lxii, no. 5, pp. 288–289. Peradeniya, May 1924.

Calotermes spp. are still among the more important pests of tea at various elevations. Isolated or local outbreaks are recorded of *Coccus viridis* (green bug), *Homona coffearia* (tea tortrix), *Stauropus alternus* (lobster caterpillar), and larvae of *Prodenia litura*, which were found on leaves of tea but seemed to do no damage. *Nephantis serinopa* is still present on some coconut estates, but measures are being taken against it. *Zeuzera coffeae* (red borer) has been recorded for the first time boring in a branch of cacao.

A study of vegetable pests has shown that snake gourd (*Trichosanthes anguina*) is attacked by larvae and adults of *Epilachna dodecastigma*, which damage the leaves, and the adults of another beetle, *Aulacophora* sp., which feed on the leaves and deposit their eggs in soil close to the main stem, the grubs feeding on the roots and lower portions of the stem. Larvae of *Phytometra* (*Plusia*) sp. and of *Margaronia indica* attack the leaves but are partly controlled by Hymenopterous parasites. The larva of an Aegeriid has also been found boring the stems.

Bitter gourd (*Momordica charantia*) is attacked by the leaf-eating beetles, *Epilachna vigintioctopunctata* and *Xenarthra cervicornis*, and fruit-flies have recently begun to attack the gourds. On cotton, *Sylepta derogata* (leaf folder) and *Stauropus alternus* were both recorded, the latter for the first time on this plant.

Johnston (T. H.) & Hitchcock (L.). **A Bacteriosis of Prickly Pear Plants** (*Opuntia* **spp.**).—*Trans. & Proc. R. Soc. S. Australia*, xlvii, pp. 162–164. Adelaide, 22nd December 1923. [Received 19th June 1924.]

A description is given of a bacterial disease of prickly pears (*Opuntia tomentella* and *O. ficus-indica*), originally found in Florida. Infected material was sent to Australia and the organism was obtained there. It is named *Bacillus cacticidus* and may be the first of its kind to be described as attacking Cactaceae.

It was ascertained experimentally that the cactus moth borers, *Melitara prodenialis* from Florida and *M. junctolineella* from Texas, as well as another Pyralid, *Mimorista flavidissimilis* from Texas, were all able during their larval stages to transmit the organism from diseased to sound portions of the same or other plants, the bacteria probably being carried on the hairs and skin of the larvae and deposited in the injuries or tunnels made by them. In such circumstances the lesions occasioned by the insects are greatly aggravated, and in the case of first instar larvae of *Melitara*, the destruction and liquefaction of plant tissue may be so rapid as to imprison or even drown them while in their tunnels. This does not happen with older larvae, which migrate from the decomposing segment and carry the infection to the next one invaded by them. The organism would also certainly be transmitted by similar Pyralid larvae, *Cactoblastis cactorum* and *C. bucyrus*, which attack cacti in South America. The boring larvae of the cactus longicorn beetles, *Moneilema* spp., also may act as transmitters as a result of contamination, and thus their action in destroying old stems and underground parts of prickly pear plants may be accelerated. Drosophilids that invade rotting and ripe fruit, decaying vegetation, etc., in Brisbane, are attracted to decomposing prickly pear, in which they readily breed and on which they feed. The flies are capable of acting as transmitters of the disease by infecting injured surfaces of segments.

Experiments were carried out with the cactus bugs, *Chelinidea vittigera*, *C. canyona* and *C. tabulata*, which were fed on healthy segments after having fed on diseased ones, but in no case did infection result.

It would appear that this organism may play an important part in prickly pear eradication in Australia during the warm moist summer by becoming associated with the larval stages of *Melitara* and *Mimorista*, and to a less extent with adult Drosophilid flies and larvae of *Moneilema*, but without these aids it will at most produce only a local lesion on the plant, acting as a wound parasite.

The following species of prickly pear occurring naturalised in Australia are susceptible to attack: *O. tomentosa*, *O. inermis*, *O. stricta*, *O. aurantiaca*, *O. megacantha*, *O. ficus-indica* and *O. monacantha*. It is probable that other less common species are also susceptible.

Gurney (W. B.). **To Control Cabbage Moth.**—*Agric. Gaz. N.S.W.*, xxxv, pt. 5, p. 325. Sydney, 1st May 1924.

To protect cabbage plants from *Plutella maculipennis* (cabbage moth), persistent spraying in the seed-beds, and later in the field, with kerosene emulsion or tobacco wash is useful, but the best spray apparently is that known as Georgia mixture. To make this, 2 lb. lead arsenate

are mixed in 50 gals. of water, and to this solution is added one-sixth of a pint of a solution of 1 lb. resin and ½ lb. fresh washing soda boiled in a quart of water until a clear brown liquid is obtained. This mixture can be sprayed up to within 5 weeks of using the vegetables.

JARVIS (E.). **Notes on Queensland Cane Insects and their Control.**—*Queensland Bur. Sugar Expt. Sta.*, Div. Ent., Bull. 17 (1923), 99 pp., 7 pls., numerous figs. Brisbane, March 1924.

This is a compilation of data obtained during the years 1914–1922, the bulk of the information having appeared in the form of the monthly and other reports that have been noticed in this *Review*.

KNIBBS (Sir G. H.). **Work in Progress.**—*2nd Ann. Rept. Inst. Sci. & Indust., 1922–1923*, pp. 9–48. Melbourne, 1st February 1924.

The most destructive insect attacking dried fruit products in Australia is *Plodia interpunctella* (Indian meal moth), which appears in all buildings where fruit is stored. As there are 2 or 3 generations a year, fruit may be infested at any season. To prevent infestation, old fruit should be promptly disposed of, racks should be kept clean, and nuts, stored grain and grain products should be kept under close examination. Packing houses should be completely emptied before any new fruit is brought in each season. Carbon bisulphide at the rate of 1 to 1½ lb. per 1,000 cu. ft. has been successful against the larvae, and two such treatments at one week's interval are successful against the moths.

A scheme for eradication of prickly pear (of which *Opuntia inermis* and *O. stricta* are the two most destructive species), which was approved in 1916 and came into force in 1920, includes a study of the insects attacking this plant. Among the insects introduced the most valuable for the purpose are cochineal insects (three strains of *Dactylopius tomentosus*), *Melitara* [*junctolineella* and *M. prodenialis*] (moth borers) from Texas and Florida, and the moth, *Mimorista* [*flavidissimilis*], from Texas. Less valuable importations are certain species of *Chelinidea* (cactus bugs), *Moneilema* beetles and scavenger flies, and several kinds of moths and midges that have not yet become established in the laboratories. Tests to determine the harmlessness of *D. tomentosus* to economic plants have been satisfactory, and this insect is to be liberated in densely infested areas in New South Wales and Queensland.

Houses infested by wood-boring insects have been found to be numerous, and as a considerable amount of timber is imported into Australia, a study is being made of these insects, about which very little is known.

MALENOTTI (E.). *Prospaltella berlesei* e *Aphelinus mali*.—*Giorn. Agric. della Domenica*, xxxiv, no. 25, p. 226. Piacenza, 22nd June 1924.

This paper describes the differences in behaviour of the two parasitic Chalcids, *Prospaltella berlesei* and *Aphelinus mali*, and of their respective hosts, *Diaspis pentagona* and *Eriosoma* (*Schizoneura*) *lanigerum*.

Kehrig (H.). **La protection des Oiseaux par la Science. Agriculture, hygiène, esthétique.**—*Rev. Zool. agric. & appl.*, xxiii, no. 1, pp. 17–22. Bordeaux, January 1924.

The necessity for the protection of bird life is dealt with, and the resolution passed by the French Association for the Advancement of the Sciences, to the effect that local scientific organisations should be established for the purpose of studying the habits and food of birds with a view to ascertaining whether they are harmful or beneficial and worthy of protection for the sake of agriculture, is quoted. The measures taken in other countries to ensure the protection of beneficial birds are discussed. A list is given of the birds protected under the International Convention of 1902 and of those species that have since been added to the number.

Feytaud (J.). **Les Hoplocampes ou Vers cordonniers dans le Sud-Ouest de la France.**—*Rev. Zool. agric. & appl.*, xxiii, no. 2, pp. 29–44, 1 pl., 2 figs. Bordeaux, February 1924. [Received 30th June 1924.]

A detailed account is given of the life-history and habits of the sawflies infesting apples, pears and plums [*R. A. E.*, A, x, 606] with special reference to their occurrence in the south-west of France. The species concerned appear to be *Hoplocampa fulvicornis*, F., *H. testudinea*, Klug, and *H. brevis*, Klug, and André's key to them is quoted.

The damage from these sawflies occurs in March and April, when the larvae that hatch from the eggs laid in the calyx during blossoming attack the fruit. Spring frosts may considerably reduce the damage as they kill the young larvae that have not penetrated deeply enough into the fruit. Natural enemies are rare, though *Bracon rotundatus*, Szp., and *B. variator*, Nees, have been recorded as parasites of *H. brevis*. Sweetened bait-traps are said to attract the adults in Italy, but in France they have had very little success. By the use of insectifuges, such as nicotine, the insects are repelled and oviposition is interrupted. For this purpose, a spray of copper or lime-sulphur with nicotine, or even a simple nicotine solution (1½ per mille) with soft soap (1½ per cent.) should be applied at the beginning of blossoming and repeated 10 or 12 days later. Arsenical sprays have a similar effect, with the additional advantage that they may poison the larvae before they have penetrated the fruit, though as a repellent they are perhaps less efficacious. The collection and immediate destruction of all infested fruit in April and May will largely reduce the numbers in future infestations, and constant cultivation of the ground, from July to March, combined with injections of carbon bisulphide or spraying with potassium sulpho-carbonate will result in killing many of the insects hibernating there.

Feytaud (J.). **Les ennemis naturels de l'Eudémis et de la Cochylis.**—*Rev. Zool. agric. & appl.*, xxiii, no. 3, pp. 66–73, 4 figs. Bordeaux, March 1924. [Received 30th June 1924.]

Natural enemies of the vine-moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] include bats, spiders and birds, which should be encouraged in the vineyards by planting shrubs and making bird shelters.

Insect enemies are *Coccinella septempunctata*, L., and other Coccinellids ; the Melyrids, *Malachius bipustulatus*, L., and *M. aeneus*, L., frequently found in winter under the bark of grape-vines ; the Clerids, *Opilo mollis*, L., and *Denops albofasciatus*, Charp. ; various Neuroptera, including species of *Chrysopa*, *Hemerobius* and *Panorpa* ; *Zicrona coerulea*, L. (blue bug) ; Syrphid larvae ; and the wasp, *Odynerus chevrierianus*, Sauss.

Parasites include the Ichneumonids, *Pimpla alternans*, Gr., *P. maculator*, F., *P. strigipleuris*, Thoms., *P. turionellae*, L., *Agrypon flaveolatum*, Gr., *Angitia* sp., *Omorgus difformis*, Gmel., *Habrocryptus alternator*, Gr., *Phygadeuon varicornis*, Th., and *Hemiteles areator*, Panz. These all oviposit on the larvae ; others such as the Chalcid, *Trichogramma* (*Oophthora*) *semblidis*, Auriv., are parasitic on the eggs. The Tachinid fly, *Phytomyptera nitidiventris*, Rond., also parasitises the larvae. Many of these parasites are attacked by hyperparasites, but the work of the beneficial species can be assisted by learning to recognise and protect them, by encouraging their multiplication by growing around the vineyards plants that will act as food for alternative hosts of the parasites, and by distributing the beneficial insects from places where they are abundant to districts where they are more rare. The biological method of control requires further study ; some years ago, an attempt was made to introduce into Gironde parasites of the American vine-moth (*Polychrosis viteana*), which is closely allied to the French species, and though the experiment was abandoned, it might be tried again with advantage.

GRASSÉ (P.). **Les ennemis des Acridiens ravageurs français.**—*Rev. Zool. agric. & appl.*, xxiii, nos. 1–3, pp. 1–16, 45–53 & 57–65, 1 pl., 10 figs. Bordeaux, January-March 1924. [Received 30th June 1924.]

This is a collected account of the natural enemies of locusts. These include mammals, birds, reptiles and insects, all of which are predacious ; insect parasites, numbering over 50 species, with the names of their hosts and the countries in which they occur, and which are considered under the heading of the stage of the insect they attack ; and fungous diseases, of which five are known.

GARMAN (H.). **The Mexican Bean Beetle in Kentucky.**—*Kentucky Agric. Expt. Sta.*, Circ. 31, 16 pp., 8 figs. Lexington, Ky., December 1923. [Received 30th June 1924.]

An account is given of the Mexican bean beetle (*Epilachna corrupta*, Muls.), which has been an important pest in Kentucky during 1922 and 1923. Beans should be closely watched in the early part of the season and dusts or sprays applied as soon as oviposition is observed. Refuse of infested crops should be destroyed when the eggs, larvae or pupae are still present on the leaves, as well as any shelter for hibernating adults. The dust recommended is 1 lb. calcium arsenate, 1 lb. sulphur and 4 lb. hydrated lime, and suitable apparatus for its application is described.

Balduf (W. V.). **The Insects of the Soybean in Ohio.**—*Ohio Agric. Expt. Sta.*, Bull. 366, pp. 148–181, 9 figs. Wooster, Ohio, June 1923. [Received 30th June 1924.]

Weekly collections of insect pests on soybeans [*Glycine hispida*] in Ohio during 1919, 1920 and 1921, confirmed the impression that this crop is comparatively free from injurious insects, though during that period 209 species were collected on the crop and on the vegetation immediately surrounding it.

The more important pests included grasshoppers, especially *Melanoplus femur-rubrum*, De G., *M. atlantis*, Riley, and *M. differentialis* Uhl.; *Empoasca mali*, Le B., (apple leafhopper); *Lygus pratensis*, L. (tarnished plant bug); *Colaspis brunnea*, F.; *Systena taeniata*, Say (pale-striped flea-beetle); *Epitrix cucumeris*, Harr. (potato flea-beetle); *Chaetocnema denticulata*, Ill. (toothed flea-beetle); *Ceratoma trifurcata*, Forst. (bean leaf-beetle); and *Plathypena scabra*, F. (green clover worm). Some account of each of these is given with notes on remedial measures.

Most of the above pests are primarily feeders on weeds surrounding the soybean fields and can be largely kept down by clean cultivation.

Parks (T. H.) & Clayton (E. E.). **Potato Hopperburn (Tipburn) Control with Bordeaux Mixture.**—*Ohio Agric. Expt. Sta.*, Bull. 368, pp. 243–258, 7 figs. Wooster, Ohio, June 1923.

The potato crop in Ohio is seriously damaged by hopperburn, transmitted by *Empoasca mali*, Le B. (potato leaf-hopper). Bordeaux mixture 5 : 7½ : 50, when thoroughly coated on the plants, was found to be very effective against the insect; the addition of nicotine sulphate did not seem to add to the effectiveness sufficiently to justify its expense. Four or five applications made with a petrol power sprayer gave the best results, the last spray apparently being the most important for hopperburn control. Dusting mixtures were less successful and more expensive than liquid sprays.

Mitchell (P.). **Observations on the Use of Magnesium Sulphate *versus* Naphthaline for the Prevention of Silver Fish, Moths, Cockroaches, etc., in Linen and other Fabrics.**—*Health*, ii, no. 3, pp. 84–85. Melbourne, May 1924.

As a result of tests of the value of magnesium sulphate crystals as compared with naphthaline against silver fish [*Lepisma*] in linen cupboards it was found that the former was far more effective. At the end of five months the cupboards under naphthaline were much infested and the naphthaline had deteriorated. Even after 12 months those under magnesium sulphate were not infested, and only a little deterioriation had occurred. The conclusion arrived at was that magnesium sulphate is of far greater efficiency than naphthaline for protecting linen and other materials against such pests as moths and cockroaches in closed spaces, but that it deteriorates rapidly in the open.

Ramachandra Rao (Y.). **Notes on Pests investigated in Madras during the Years 1921-22.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 19–22. Calcutta, 1924.

In spite of the Act against cotton pests, the stem weevil, *Pempheres affinis,* has not been checked to any great extent, but the situation with regard to *Platyedra gossypiella* (pink boll worm) is improving.

It is becoming evident that *Schoenobius incertellus* is not an extremely serious pest. *Calocoris angustatus* is reported doing considerable damage locally, but no practicable control has yet been worked out. The decrease of yield in betel vines [*Piper betle*] is probably due to the root knot eelworm, *Heterodera radicicola.* The Capsids, *Ragmus morosus* and *R. flavomaculatus,* found on cotton, are regarded as chiefly responsible for the bud and boll fall [*R. A. E.*, A, xi, 216]. *Heliothis obsoleta* is a regular bollworm of Cambodia cotton, especially in young bolls.

The rice stem fly [*Atherigona* sp.], first discovered in 1920, has since been found to breed in local varieties of wheat. *Leptocorisa varicornis* was reported on *Setaria italica,* and *Laphygma exigua* as doing serious damage in nurseries of *Eleusine coracana.* Poison baits and flooding, with oiling of the irrigation water, was found more successful than spraying against the latter. *Contarinia andropoginis* lays eggs in the flowers of late-formed ear-heads of *Sorghum,* and the larva attacks the young grain.

The rubber bark caterpillar, *Aetherastis circulata,* feeds on the bark of rubber trees, generally at about three feet from the ground. There are apparently about two broods a year between January and May, pupation lasting about ten days.

Susainathan (P.). **Fruit-sucking Moths of South India.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 23–27, 2 pls. Calcutta, 1924.

Certain Noctuid moths, chiefly *Othreis* (*Ophideres*) *fullonica,* L., and *O. materna,* L., puncture citrus and pomegranate fruits in South India. The damage is done at night, the moths hiding among bushes by day. Other moths that probably help to damage the fruit are *Anua* spp. and *Lagoptera* spp., while *Achaea janata,* L., *Ercheia diversipennis,* Wlk., *Parallelia algira,* L., *Polydesma quenavadi,* Gn., *Pelamia frugalis,* F., *Pericyma glaucinans,* Gn., and *Simplicia robustalis,* Gn., swarm round the damaged fruit both on the trees and on the ground. *Calpe ophideroides,* Gn., is destructive to nectarines and peaches.

As regards control, experiments with poison bait gave the best results, using slips of mango fruit steeped in a thick solution of sodium arsenate (4 per cent. by volume), mixed with jaggery syrup and arrack, the moths dying within 24–36 hours. Effective mechanical means are hand-netting and enveloping each fruit in lotus leaves, which, owing possibly to their property of emitting a nicotine-like odour, repel the moths. A spray is useful as a deterrent, the most successful being crude oil emulsion, 1 lb. to 8 gals. water. The problem of control would be solved by the evolution of a mixture of poisoned molasses that the moths would prefer to the fruit. An apparatus, previously described [*R. A. E.*, A, x, 482], for use with poison-baits against the moths, might be of value.

Susainathan (P.). **Some important Pests of the Malay Peninsula.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 28–33. Calcutta, 1924.

The pests of coconut and other palms in Malaya are *Oryctes rhinoceros*, L.; *Rhynchophorus schach*, Oliv.; *Brachartona catoxantha*, Hmpsn.; *Tirathaba* sp. near *trichogramma*, Meyr.; *Batrachedra arenosella*, Wlk., the eggs of which are laid in the linear depressions of the green spathe, the larvae boring into the unopened inflorescence; *Plesispa reichei*, Chap., a useful preventive measure being immersion of the seedlings in a 0·25 per cent. solution of lead arsenate; *P. nipa*, Maul., on wild sago palms; *Gangara thyrsis*, Mo., which breeds more extensively on *Calamus rotang* than on coconut palms; *Hidari irava*, Mo., which prefers coconut to other palms; *Amathusia phidippus*, Joh., on African oil-palm leaves; *Catantops splendens*, Thunb., sometimes defoliating young coconut palms; *Atractomorpha crenulata*, F., the common South Indian tobacco grasshopper, which appears to be a sporadic minor pest of coconut seedlings; *A. psittacina*, De Haan, and *Tagasta marginella*, Thunb., both minor defoliators of coconut; and *Diocalandra frumenti*, F., in felled coconut trunks.

The pests of rubber are *Hemithea costipunctata*, Mo., damaging the unopened blossoms; *Coptotermes gestroi*, Wasm.; *Doloessa viridis*, L., destructive to stored rubber seeds; and *Omadius seticornis*, Westw., which breeds in the trunks.

The pests of rice are *Leptocorisa varicornis*, F., and *L. acuta*, Thunb.; *Scotinophara* (*Podops*) *coarctata*, F.; *Diatraea auricilia*, Dudg.; *Schoenobius incertellus*, Wlk. (*punctellus*, Wlk.); *Chapra mathias*, F.; *Spodoptera pecten*, Gn., which sometimes also damages lawn and fodder grass; *Nezara viridula*, L., which sucks the earheads, but is kept in check by a Reduviid, *Sycanus collaris*, F.; *Tetroda histeroides*, F.; *Oxya velox*, F.; *O. vicina*, Bol.; *Cyrtacanthacris succincta*, L.; *C. luteicornis*, Serv.; *Nephotettix bipunctatus*, F.; *Melanitis ismene*, Cram.; and *Nymphula depunctalis*, Gn.

Banana foliage is attacked by *Erionota thrax*, L.; and castor oil plants are defoliated by *Achaea janata*, L., *Notolophus posticus*, Wlk., and *Tiracola plagiata*, Wlk.

The leaves of cinchona are destroyed by *Margaronia marginata*, Hmpsn., and a serious pest of *Citrus* is *Crocidomera robusta*, Mo., which causes the fruit to fall and renders it unfit for use.

Cephonodes picus, Cram., defoliates Liberian coffee, but, although it occurs on coffee and on *Morinda tinctoria*, it has not been noted as a pest in South India.

Other miscellaneous pests are *Podontia quatuordecimpunctata*, L., defoliating orchards; *Acontia transversa*, Gn., feeding on *Hibiscus*; *Arge victoria*, Kby., attacking the buds and leaves of roses, and another sawfly, thought to be *Athalia proxima*, Klug, attacking cultivated Cruciferae; and *Phragmatoecia parvipunctus*, Hmpsn., and *Scirpophaga* spp., which are serious borers of sugar-cane.

Husain (M. A.) & Mathur (U. B.). **Some Parasites of the Cotton Bollworms** (*Earias insulana* **and** *E. fabia*) **in the Punjab.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 34–52. Calcutta, 1924.

The parasites observed to date on the various stages of *Earias insulana*, Boisd., and *E. fabia*, Stoll, in the Punjab are *Trichogramma*

evanescens, Westw., parasitic on the eggs; *Bracon lefroyi*, D. & G., *B. kitcheneri*, D. & G., *Rhogas testaceus*, Grav., var., *Elasmus* sp., *Actia aegyptia*, Vill., and an unidentified Ichneumonid, parasitic on the larvae; and *Melcha nursei*, Cam., *Chalcis tachardiae*, Cam., *C. responsator*, Wlk., a third species of *Chalcis*, *Chelonus* sp. and *Centrochalcis* sp., bred from the pupae. Notes are given on the bionomics of each of these parasites, with a table showing the actual number of moths and their parasites bred out in the laboratory of the Punjab Agricultural College. From data collected in the field, the highest percentage of parasitism obtained was 50, recorded for Hissar in 1922.

So far as their observations go, the authors are unable to say that the parasites keep the pests in check, or that they provide a workable method of control.

MATHUR (U. B.). **Colour Variations in** *Earias insulana*, **Boisd., in the Punjab.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 53–55. Calcutta, 1924.

A table is given showing the variations in the colour of the forewing of this cotton bollworm.

RAMACHANDRA RAO (Y.). **A Note on a new Cotton Bollworm,** *Rabila frontalis*.—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 56–57. Calcutta, 1924.

A new cotton bollworm, *Rabila frontalis*, Wlk., is recorded from South India and Ceylon. It appears to breed normally only in native tree-cottons. The life-history of this Noctuid has not yet been worked out, but the eggs are probably laid singly on the bolls. The caterpillar feeds on the entire substance of the boll, scooping it out completely. After having destroyed two or three bolls, it pupates in the ground, the moth emerging in three to four weeks in October and November. The larvae are parasitised by *Bracon* sp.

FLETCHER (T. B.). **The American Cotton Boll-weevil: a Menace to India.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 58–64. Calcutta, 1924.

Owing to the possibility of the American cotton boll weevil, *Anthonomus grandis*, obtaining a footing in India, attention is drawn to its habits and to the enormous loss it causes to the cotton crop in America. The probability of its introduction into India has been accentuated recently by the large importations of American cotton.

NATH (D.). **Preliminary Observations on the Attraction to Light of Moths of Sugarcane-borers.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 65–74. Calcutta, 1924.

In experiments with an electric light trap, collections during 59 nights captured 3,194 moths of cane borers, 36 per cent. being males. Over 2,000 of the captures were *Chilo simplex* and other species of *Chilo* and *Diatraea*, the remainder being species of *Scirpophaga* and *Emmalocera*.

KANNAN (K. K.). **A new Remedy for Sugarcane Borers: preliminary Note.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 75–76. Calcutta, 1924.

Of the borers attacking sugar-cane in Mysore, three are species of *Diatraea*, two of *Scirpophaga* and one of *Sesamia*. To trap the adult moths heaps of cane trash are placed in the fields, and the moths that hide in them by day are collected. The work should be continued for about two months from the first appearance of the young shoots.

GHOSH (C. C.). **A preliminary Note on the Borers of Sugarcane, Rice, etc., in Burma.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 77–86, 2 pls. Calcutta, 1924.

This paper deals with the pests already discussed [*R. A. E.*, A, ix, 69; x, 156] that have been observed in Burma during the past two years. As external agents of damage to sugar-cane termites are common in some places, the larvae of *Anomala antiqua* and of a species of *Holotrichia* attack the roots, and *Oryctes rhinoceros* and *Xylotrupes gideon* are believed to be responsible for damage leading to "dead heart."

The borers of rice are *Pachydiplosis oryzae*, *Schoenobius incertellus* (*bipunctifer*), *Sesamia inferens*, *Diatraea* sp. and *Chilo oryzae*, and of sugar-cane, *Diatraea auricilia*, *Argyria tumidicostalis*, *Sesamia inferens*, *Scirpophaga xanthogastrella* and a Curculionid.

Anthomyiid flies are found in young *Sorghum*, and a Pyralid borer in *Panicum crus-galli*, a grass that grows among rice. Brief notes on the life-history of each of these pests are added.

GHOSH (C. C.). **A Note on the Rice Hispa** (*Hispa armigera*).—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 87–88. Calcutta, 1924.

While *Hispa armigera* in Upper Burma can hardly be classed as a pest, in Lower Burma it is injurious practically every year from July to October, the beetles eating the rice blades and the larvae mining the leaves. As the life-cycle takes only about two weeks, this pest multiplies rapidly. It also breeds on wild grasses. The best means of control is to sweep up the beetles with hand nets when they first appear, choosing dry weather, and to cut off and burn all dry tops containing larvae and pupae.

GHOSH (C. C.). **A Note on** *Nymphula depunctalis* **(Rice Case-worm).**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, p. 89. Calcutta, 1924.

The rice case-worm, *Nymphula depunctalis*, is common in Lower Burma about July. The seedlings are attacked, the larvae eating away the leaf tissue and causing the leaves to turn yellow and dry. Collection of the leaf cases appears the only effective remedy. A small hand-net of thin muslin on a triangular frame to form the mouth, and drawn with one side of the frame just under the surface of the water, is the best instrument.

Ghosh (C. C.). **A Note on the Occurrence of** *Cirphis unipuncta* **in the Rôle of "Army Worm."**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 90–91. Calcutta, 1924.

In 1922 *Cirphis unipuncta* appeared in large numbers in three different districts of Burma at the beginning of October. This moth is a pest of rice, maize, wheat, oats, millet, etc., but the only crop attacked in this case was *Sorghum*.

Ramachandra Rao (Y.). **An Outbreak of** *Nephantis serinopa* **at Mangalore in 1922.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 92–98, 3 pls. Calcutta, 1924.

A serious outbreak of *Nephantis serinopa* occurred in 1922 on coconuts in Mangalore, the infestation probably originating in consignments of coconut seedlings sent by rail from Travancore.

Although endemic in Southern India, *N. serinopa* apparently only becomes a pest sporadically, its natural enemies evidently keeping it in check. These are a Chalcid, which attacks the pupae, a Braconid that attacks the larvae, and the Carabids, *Callida splendidula*, F., and *Plochionus nigrolineatus*, Chaud., predacious on the larvae and pupae.

Ghosh (C. C.). *Oryctes rhinoceros* **and other important Palm Pests in Burma.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 99–103. Calcutta, 1924.

The cultivation of coconuts in Burma is fast decreasing, chiefly owing to the ravages of insect pests, the most important being *Oryctes rhinoceros*, which also attacks other palms, but not betel-nut palm, *Areca catechu*. The principal breeding places in Burma are farmyard manure heaps, rotting rice-straw heaps and dead palm stems. Breeding is continuous, fresh broods occurring normally about every four or five months.

Other important pests of coconut are *Xylotrupes gideon*, which bites the leaf-stalks, and has apparently a similar life-history to that of *O. rhinoceros* ; *Rhynchophorus ferrugineus*, common in all places where *O. rhinoceros* is found ; and *Nephantis serinopa*. This moth passes its whole life on the palm. The only effective measure consists in cutting off and burning the first affected lower leaves.

Kannan (K. K.). **An interesting Principle in Economic Entomology and some suggested Applications.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, p. 104. Calcutta, 1924.

This paper has been already noted elsewhere [*R. A. E.*, A, xi, 326].

In a discussion of the paper it was stated that the idea of control by means of wire-netting has been already tried in America in the case of the codling moth [*Cydia pomonella*], the trees being banded with wire netting that the larvae can enter for pupation, but from which the moths cannot escape. It is doubtful whether the method would be of much use against *Oryctes rhinoceros* in its natural state. The best means of controlling this pest is to keep palm groves clean and free from rubbish.

Ghosh (C. C.). **A Note on** *Anomala antiqua.*—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 105–107. Calcutta, 1924.

Anomala antiqua is typical of the four or five species of Melolonthid and Rutelid beetles of Burma that feed in the larval stage on the roots of crops, such as sugar-cane, *Sorghum,* millets and even ground-nuts, and, as adults, on the leaves of fruit and other trees and also on field crops, such as *Sesamum.* This beetle occurs as a pest in the adult stage in July and August. Spraying plants of *Hibiscus cannabinus* with an emulsion of 8 oz. bar soap, 1 gal. water and 2 gals. kerosene oil, using one part of the emulsion to five of water, keeps the beetles from settling on the leaves for two days, after which the spray must be repeated. In the laboratory, eggs laid in the third week of August took 8 to 10 days to hatch. The larvae became full-grown in about a month and entered a resting stage till they pupated in March of the following year. Pupation lasted about 12 to 14 days, but the beetles remained in the pupal cells for some days longer.

Subramaniam (T. V.). **Some Coccinellids of South India.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 108–118. Calcutta, 1924.

Thirty-seven of the common Coccinellids of South India are dealt with in this paper, short notes being given, in the majority of cases, on their life-history, food and distribution.

Husain (M. A.) & Mathur (U. B.). **A preliminary List of Parasites of Economic Importance bred in the Punjab.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 119–121. Calcutta, 1924.

A table is given of 31 parasites bred from various pests, with the name of their host, the stage attacked, and their distribution in the Punjab.

Husain (M. A.) & Nath (D.). **The Life-history of** *Tetrastichus radiatus* **parasitic on** *Euphalerus citri,* **Kuw. ; and its Hyperparasite.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 122–128. Calcutta, 1924.

The eggs of *Euphalerus citri,* Kuw., a serious pest of *Citrus* in the Punjab, are laid in the axils of leaves, the nymphs and adults sucking the juice from young leaves. The nymphal life varies from 11–13 days in summer to 34–36 in winter, the complete life-cycle taking 16 days in summer and 46 in winter. The nymphs are attacked during certain parts of the year by various parasites, the most abundant being *Tetrastichus radiatus,* Wtrst., which is itself attacked by two unidentified hyperparasites.

Misra (C. S.). **The Citrus White-fly,** *Dialeurodes citri,* **in India and its Parasites, together with the Life-history of** *Aleurodes ricini,* **n.sp.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 129–135. Calcutta, 1924.

Since mechanical means of bringing *Dialeurodes citri,* Ashm. (citrus white-fly) under control in California have proved unsuccessful,

attempts are now being made to introduce natural enemies from the East. Internal parasites of *D. citri* in India are the Chalcids, *Aphelinus fuscipennis*, How., *Prospaltella lahorensis*, How., and a new species of *Prospaltella*.

Aleurodes ricini, sp.n., is closely related to *D. citri*, and is also parasitised by *Aphelinus fuscipennis* and a species of *Prospaltella*. Though this Aleurodid has been previously recorded under this name, no full description of it has been published. A Coccinellid, *Clanis soror*, Wse., preys upon the larvae, puparia and egg-laying females, and larvae of *Chrysopa* spp. devour the larvae and the egg-laying females. *A. ricini* is a serious pest of *Ricinus communis*, which is so important as the food-plant of *Attacus ricini*, Boisd. All stages are passed on the lower surface of the leaves, where the eggs are laid in small clusters from the beginning of February. The larvae have four instars. The adults are active during the day, but become torpid with cold. All stages are found in numbers on the leaves from February to the end of November. Only in December and January does the number of adults become less. A complete life-cycle from July to September lasts 19–21 days.

Beeson (C. F. C.). **The geographical Distribution of the Coleopterous Borers of Sal** (*Shorea robusta*).—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 159–175. Calcutta, 1924.

The greater part of this paper consists of a historical summary of the geographical distribution of *Shorea robusta*. The borer fauna of the tree is tabulated according to its distribution, and consists of 28 Scolytids, 22 Longicorns, 9 Bostrychids, 3 Curculionids, 1 Brenthid and 3 Anthribids.

In commenting on this paper, Mr. T. B. Fletcher remarked upon the dispersal of borers by means of floating logs carried by river and marine currents.

Bhasine (H. Dass). **Air-tight Storage of Grain.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 228–237. Calcutta, 1924.

To discover whether hermetical sealing is an effective method of dealing with pests of stored grain, glass flasks of varying capacity filled with wheat of different types and with a known number of larvae of *Trogoderma granarium* (*khapra*) were corked and sealed with paraffin and made absolutely air-tight. In all cases (except two doubtful ones) the insects died in less than a month. Further experiments to find out if the pitchers used for storing wheat in India could be made air-tight were unsuccessful, and after more than a year of storage living insects were found in them. An air-tight condition is therefore either not easy to obtain or it fails on a large scale. In flasks containing carbon dioxide, the death of weevils is hastened in an air-tight receptacle, but they die through lack of oxygen and not through direct poisoning by carbon dioxide. Using this gas in large metal tins, the time required to kill the weevils was generally less than a month. Apparently carbon dioxide has no deleterious effect on the germination of wheat. Tables are given showing in detail the results of the various experiments.

Misra (C. S.). **A preliminary Account of the Tachardiphagous Noctuid Moth** *Eublemma amabilis.*—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 238–247. Calcutta, 1924.

Previous articles [*R. A. E.*, A, ix, 80; xi, 438] have dealt with the danger of the predacious Noctuid, *Eublemma amabilis*, to the cultivation of lac (*Tachardia lacca*), and if any progress is to be made in the industry it is essential that more should be known regarding the life-history of this moth. Six species of *Eublemma* have been recorded as destroying Coccids, of which four, *E. vinotincta, E. coccidiphaga, E. amabilis* and *E. scitula*, are known in India and Ceylon, and have been observed feeding on species of *Lecanium, Pulvinaria, Tachardia* and *Anomalococcus*. *E. amabilis* is especially destructive where lac cultivation has been started for the first time. In the past the ravages of the moth have increased owing to defective methods of cultivation. The practice of inoculating half the tree, or leaving a part of the crop on the tree for the following season, has led to its breeding in enormous numbers. It may, moreover, do a considerable amount of damage before its presence is realised, the larvae being hidden as they feed and the moths being rarely seen by day. If only clean, well desiccated lac or, alternatively, seed lac, were used, much would be already accomplished towards limiting the insect. Unfortunately the moth has a number of alternative hosts and is widely distributed, being present in practically all centres of lac cultivation.

The eggs are laid singly on the resinous cells of the lac insect, some of the eggs of the same female maturing earlier than the others; and the larvae, on hatching, at once make their way into the cells and proceed to devour both males and females, though more of the latter. When full-fed the larvae pupate or aestivate according to the time of year. Moths are present from March to December, and there are two to three broods in a year.

The larva of a Braconid parasite has been found on the caterpillars, and occasionally a Chalcid is found parasitising the larvae in their galleries, but no effective predator is known.

Husain (M. A.) & Pruthi (H. S.). **A short Note on the Life-history of the Mango-hoppers** (*Idiocerus* **spp.) in the Punjab.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 252–260. Calcutta, 1924.

Idiocerus atkinsoni, Leth., and *I. clypealis*, Leth., are very serious pests of mangos in all the mango-growing tracts of India, the former being the more common. Both species pass the larger part of the year as adults, hiding in the crevices of the bark in winter. Oviposition, in the tissues of the unopened flowers, takes place from the middle of February to the middle of March, *I. clypealis* beginning breeding a little later than *I. atkinsoni*. There is only one brood a year. The eggs hatch in 8–10 days, the young becoming adult in about 20 days and breeding the following spring.

In the discussion that followed this paper it was stated that these Jassids give little trouble at Pusa, where the attacks of a parasitic fungus, which may be a controlling factor, have been observed. Spraying is considered an economic possibility if the crop is very valuable. While there is only one brood in the Punjab, in Mysore there is a second one during July to October, in the case of *I. atkinsoni* and *I. niveosparsus*, Leth.

Ramakrishna Ayyar (T. V.). **Short Notes on some South Indian Insects.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 263–269, 4 pls. Calcutta, 1924.

The South Indian insects not already recorded [*R. A.E.*, A, viii, 146 ; ix, 68 ; x, 152, 289] include *Xanthopimpla nursei*, effective in checking *Chilo simplex* in certain seasons, as well as the following pests :— Coleoptera : *Cantharis setacea*, attacking cowpeas and red gram [*Cajanus indicus*], not previously noted as a pest ; and *Olenecamptus bilobus*, recorded for the first time on mulberry. Lepidoptera : *Othreis* (*Ophideres*) spp., chiefly *O. fullonica*, seriously damaging ripening oranges ; *Catephia inquieta*, recently injurious to sweet potatoes ; *Hippotion celerio*, defoliating vines ; *Glyphodes laticostalis*, a serious pest of forest trees ; *Meridarchis scyrodes*, as well as a fruit-fly, *Carpomyia vesuviana*, the larvae of which attack fruits of *Zizyphus jujuba* but are parasitised by Braconids, the former by *Microbracon* sp. and the latter by *Opius fletcheri* ; and *Phassus malabaricus*, of which the larvae bore in the stem of *Gmelina arborea*. Rhynchota : *Antestia cruciata*, often noted on coffee ; *Jurtina indica* and *Halyomorpha picus*, attacking pomegranate fruits ; and *Bredenbachius delineatus* and *Euphalerus citri*, pests of *Cordia myxa*.

A species of *Chermes*, probably the first record of this Aphid in South India, was noted damaging pine trees.

Ramachandra Rao (Y.). **A further Contribution to a Knowledge of South Indian Grass Gall Midges.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 270–274. Calcutta, 1924.

This paper is a continuation of previous work [*R. A.E.*, A, vii, 309]. In the study of the rice gall-midge, *Pachydiplosis oryzae*, it is important to know how the pest recurs year after year, since, during the dry, hot summer in South India, most of the grasses that may be alternative food plants become parched, and a continuance of breeding of flies on these grasses in summer would appear to be an impossibility. To solve this question the author experimented with an unidentified gall-midge in *Pennisetum cenchroides*. Having protected the plants from any outside contamination by means of wire gauze, he found that fresh galls developed, from which gall flies were reared, thereby confirming his belief that the young larvae remain quiescent in the nascent buds underground and develop when the latter shoot after the rains. A tabular list is given of grasses in which galls were observed and the identifications, when made, of the flies obtained from them.

Ballard (E.) & Ramachandra Rao (Y.). **A preliminary Note on the Life-history of certain Anthomyiad Flies,** *Atherigona* **spp. and** *Acritochaeta excisa*, **Thomson.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 275–277, 1 pl. Calcutta, 1924.

This paper summarises the results of observations made at Coimbatore between 1914 and 1921. The species of *Atherigona* dealt with are the " Cholam " fly, the " Cumbu " fly and the rice-stem fly. The eggs of the first hatch in 36–44 hours, the larval period lasting 6–10 days and the pupal period 6–7 days. The larvae live on *Sorghum*, attacking only the young seedlings and shoots. The " Cumbu " fly attacks both seedlings and full-grown plants of *Pennisetum typhoideum*, the egg stage lasting 37–48 hours, the larval 7–9 days and the pupal about

6 days. The larvae of the rice-stem fly damage the rice plants only in the seedling stage. The eggs hatch in 33–48 hours, the larval period being 6–7 days and the pupal 7 days.

The eggs of the tomato fly, *Acritochaeta excisa*, Thoms., hatch in 28–36 hours, and the larval and pupal stages last 6–7 days each.

The Anthomyiid flies that have been noted on other cereals, such as *Panicum miliare*, *P. frumentaceum* and *Paspalum scrobiculatum*, are all different.

Iyengar (M. O. T.). **The Life-history of a Tingid Bug,** *Monanthia globulifera.*—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 296–299, 2 pls. Calcutta, 1924.

Monanthia globulifera occurs commonly on *Ocimum sanctum* (tulsi), causing the leaf-tips to curl and dry up and the leaves to fall. It has also been recorded from other Labiatae, but is not considered of serious economic importance. Descriptions are given of all five instars and of the adult.

Ramachandra Rao (Y.). **A Note on Dimorphism in** *Pundaluoya simplicia*, **Distant** (*Dicranotropis maidis*, **Ashm.**).—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923,* pp. 406–408, 1 pl. Calcutta, 1924.

The Fulgorid, *Dicranotropis maidis*, Ashm. (*Pundaluoya simplicia*, Dist.), attacks *Sorghum*, maize and *Pennisetum typhoideum*, the eggs being laid in the leaf-tissue. Large numbers of the young bugs are found in the top whorls of the young plants and in the earheads. The nymphs pass through five moults and become adult in about 16–20 days.

Kalshoven (L. G. E.). **Boeboek-aantastingen bij Hevea-boomen.** [Shothole-Borers of *Hevea*.]—*Arch. Rubbercultur*, viii, no. 6, reprint 11 pp. Buitenzorg, June 1924. [With a summary in English.]

The shot-hole borers infesting *Hevea* in the Dutch East Indies may be divided into three classes: green-wood borers (Scolytids), which only attack wood still containing most of its sap; sap-wood borers (Bostrychids), found in drying branches and stems; and dry-wood borers (Lyctids) only living in dry material.

The species concerned are:—Scolytidae: *Xyleborus perforans*, Woll., *X. globus*, Bldf., *X. fornicatus*, Eichh., *Scolytoplatypus hamatus*, Hag., *Crossotarsus saundersi*, Chap., *C. wallacei*, Chap., *Platypus solidus*, Wlk., *P. signatus*, Chap., *P. jansoni*, Chap., *P. lucasi*, Chap., and *P. westwoodi*, Chap. Bostrychidae: *Xylopsocus capucinus*, F., and *Heterobostrychus aequalis*, Wat. Lyctidae: *Lyctus brunneus*, Steph., in a specimen of *Hevea* in a plantation museum.

These beetles only attack sound *Hevea* trees exceptionally, and in most cases infestation by them can be traced to some previous injury. None of them is peculiar to *Hevea*.

Corbett (G. H.) & Gater (B. A. R.). *Batrachedra arenosella,* **Walk. (Cosmopterygidae), in relation to the Nut-fall of Coconuts.**—*Malayan Agric. Jl.,* xii, no. 5, pp. 115–122. Kuala Lumpur, May 1924.

Batrachedra arenosella, Wlk., is injurious to the flowers of the unopened coconut spike. The eggs are laid on the spathe, and the larvae bore into the spike. Many substances were tried as insecticidal sprays, of which tar oil seemed to be the best, and it was found possible to reduce the extent of the damage from 56 per cent. to 10 per cent. of the female flowers. Investigation showed, however, that the direct injury caused by the caterpillars is negligible, and that the majority of nut-falls on the area is due to other causes.

Tanaka (K.). **Studies on** *Aphis rumicis,* **L., on the Lily.**—*Jl. Plant Protection,* xi, pp. 29–35 & 151–162. Tokyo, 1924.

Aphis rumicis is very injurious to lilies in Japan. In Yokohama it is continuously viviparous throughout the year, without producing sexual forms, and about 27 generations occur annually. It may be seen at any season on lilies, being most abundant in May, July and September.

Muramatsu (S.). **Life-history of** *Agrilus mali,* **Mats. (Buprestidae).**—*Korea Agric. Expt. Sta.,* Rept. no. 2, pp. 1–21, 4 pls. 1924.

Agrilus mali, Mats., seriously damages apple trees in Korea as well as in China. There is one generation a year. The adults are abundant from the middle of June until September, and live about 3 weeks. They are inactive in the morning and their power of flight is weak. The eggs are laid singly on the surface or in crevices of the branches or trunk, incubation lasting 2 or 3 weeks. The larvae bore into the stems or the branches and hibernate there. Pupation occurs in May or June, the adults emerging 12–19 days later. A Braconid is parasitic on the larvae and sometimes destroys 4 or 5 per cent. of them.

Neave (S. A.). **The Work of the Imperial Bureau of Entomology.**—*Empire Cotton Growing Rev.,* i, no. 3, pp. 191–195. London, July 1924.

An account is given of the work, organisation and scope of the Imperial Bureau of Entomology, which aims at disseminating information and advice regarding insect pests while keeping practical workers informed of the progress made in the struggle against them throughout the world. The main branches of its activities, namely, identification of insects and publication work, are discussed.

Lefroy (H. M.) & Lean (O. B.). **Insect Pests of Cotton.**—*Empire Cotton Growing Rev.,* i, no. 3, pp. 196–206. London, July 1924.

A general account is given of the more important cotton pests occurring in the principal cotton-growing regions of the world. Over 500 species injurious to cotton have been recorded, some of which are attacking the crop during every stage of its growth. As cotton belongs to a family of plants (Malvaceae) that is widely spread, both wild and

in cultivation, it is likely to be seriously affected by some insect that rises to the status of an important pest in every fresh region in which it is grown ; it is therefore necessary to make a study not only of the major pests, but also of the more numerous minor and potential ones.

Oehlhey (H. R.). **Beitrag zur Kenntnis von** *Selenephera lunigera* **ab.** *lobulina* **Esp. (Lep., Lymantr.).** [A Contribution to the Knowledge of *S. lunigera* ab. *lobulina*.]—*Zeitschr. wiss. Insektenbiol.*, xix, no. 5, pp. 127–128. Berlin, 25th May 1924.

Rebel has stated that the larvae of the Lymantriid, *Selenephera lunigera* ab. *lobulina*, Esp., live on pine and rarely on spruce. In the Gera district the author finds that they feed exclusively on spruce and occur chiefly on *Picea excelsa*.

Uvarov (B. P.). **A Revision of the Old World Cyrtacanthacrini (Orthoptera, Acrididae).—v. Genera** *Cyrtacanthacris* **to** *Loiteria*.—*Ann. & Mag. Nat. Hist.*, xiv, no. 79, pp. 96–113, 2 figs. London, July 1924.

This is the fifth and final section of this revision [*R. A.E.*, A, xii, 135].

Fryer (J. C. F.) & Pethybridge (G. H.). **The Phytopathological Service of England and Wales.**—*Jl. Minist. Agric.*, xxxi, no. 4, pp. 331–340. London, July 1924.

This paper surveys the actual state of official phytopathological activities in Britain, and gives a *résumé* of the various phases of work carried out directly or indirectly by the Government with the object of controlling damage by plant pests and diseases in England and Wales. A brief forecast is given of the possible lines of development of the service in the future.

Theobald (F. V.). **New and little known British Aphids.**—*Ent. Mo. Mag.*, lx, pp. 124–130, 7 figs. London, June 1924.

The new species described are : *Anuraphis cynariella* from N. Wales on globe artichoke (*Cynara scolymnus*) ; *A. rumicella* from Kent and Italy on dock (*Rumex*) and Jerusalem artichoke (*Helianthus tuberosus*) ; *Aphis compositellae* from N. Wales on *Sonchus* sp. and another Composite ; *Myzus vaccinii* from Yorkshire on *Vaccinium vitis-idaea* ; *M. molluginella* from Flintshire on *Galium* sp. ; and *Aphis dallmani* from the neighbourhood of Doncaster on *Agrimonia eupatoria*.

Mayné (R.). **Le Doryphore de la Pomme de terre** (*Leptinotarsa decemlineata*, **Say**).—*Ann. Gembloux*, xxx, no. 5, pp. 145–153, 1 pl. Brussels, May 1924.

In view of the appearance of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in Europe and of its possible spread to Belgium, an account is given of the insect and of measures against it, as well as a list of the regulations with regard to the campaign against it in France [*R. A.E.*, A, xi, 16, 232, etc.].

Faure (J. C.). **La Psyché des montagnes dans le Massif central.**— *C.R. Acad. Agric. France*, x, no. 23, pp. 664–667. Paris, 1924.

In the mountainous regions of Loire and Ardèche heavy invasions of *Oreopsyche angustella*, Hs. (*Psyche atra*, Esp.) frequently occur; the damage begins when the snows melt and lasts until about May or June, the caterpillars generally migrating in bands and attacking chiefly graminaceous plants, of which very little is left after their passage. This moth very seldom occurs below about 3,000 ft. Stock rearing is the only industry and the pastures are consequently most valuable. Experiments have shown the most successful remedy to be a poison-bait consisting of 100 parts by weight of commercial bran-molasses mixture (containing 40 per cent. of molasses) with 4 parts arsenic and sufficient water to moisten. In the mountains, the dew is generally sufficient to keep the bait moistened so as to remain effective for about 10 days. Cattle must of course be kept away from the bait, but it is generally safe for them to return to the pasture as soon as the grass has grown again.

Matthey (R.). **Biologie de** *Tachina larvarum*, **Meigen.**— *Ann. Paras. hum. & comp.*, ii, no. 3, pp. 202–206, 4 figs. Paris, July 1924.

The method of parasitism of the Sphingids, *Chaerocampa elpenor* and *Pterogon proserpina* (both commonly found on *Epilobium parviflorum*) by *Tachina larvarum* is described. The parasitic larvae are so situated in the larval body of their host that their respiratory orifice is in direct contact with the air taken in through its stigmata. The body content of the host larva is consumed just about the time when it would normally pupate, and almost as soon as the host is dead the parasitic larva emerges and descends to the ground for pupation and hibernation, the adult fly appearing in June or July of the following year.

Ferrière (C.). **Le parasitisme externe des Oncophanes (Braconides).**— *Schweizer Ent. Anz.*, i, no. 1, pp. 3–4. Zürich, 1st January 1922. [Received 7th July 1924.]

The larvae of a Tortricid, probably *Tortrix* (*Cacoecia*) *sorbiana*, Hb., infesting *Prunus padus* were parasitised externally by larvae that on being bred out proved to be *Oncophanes lanceolator*, Nees.

Schneider-Orelli (O.). **Ueber Reblausversuche im Sommer 1921.** [Phylloxera Experiments in the Summer of 1921.]—*Schweizer Ent. Anz.*, i, no. 1, pp. 4–5. Zürich, 1st January 1922. [Received 7th July 1924.]

Previous experiments aimed at ascertaining the effect of *Phylloxera* from Zürich on American vine stocks [*R. A. E.*, A, x, 79]. The present paper describes experiments in infecting non-grafted vines, of which there now exist varieties that are resistant to the Aphid and yet produce grapes of good quality. As they are being planted on an increasing scale, it was thought desirable to ascertain if they can resist infection by *Phylloxera* from Zürich. It was found that Taylor vines in pots became heavily infested and showed typical nodosities, but that

Riparia × Gamay 595 was not attacked; it has previously been pointed out, however, that American vines that become infested when in pots are free when planted in the open, and further tests are required.

K[LÖTI]-H[AUSER (E.)]. **Neueste Untersuchungen über Spinnmilben.** [The latest Investigations on Spinning Mites.]—*Schweizer Ent. Anz.*, i, no. 3, pp. 17–19. Zürich, 1st March 1922. [Received 7th July 1924.]

This is a brief general account of present-day knowledge of spinning mites, the injury they do, and the methods for combating them.

K[LÖTI]-H[AUSER (E.)]. **Ein ernster Weidenschädling.** [A dangerous Pest of Willows.]—*Schweizer Ent. Anz.*, i, no. 5, p. 33. Zürich, 1st May 1922. [Received 7th July 1924.]

The willow-leaf beetle, *Phyllodecta vulgatissima*, L., is a pest of increasing importance in Switzerland. The hibernated adults may appear in March, and they mate in April and May after skeletonising the young willow leaves, which injury is continued by the larvae in June and July. Pupation occurs in the ground, and the adults emerge in August, feed until autumn, and then hibernate beneath fallen leaves. The usual measures—flooding in winter, burning fallen leaves and spraying with a nicotine solution—are not quite reliable, and spraying with a stomach-poison, such as lead arsenate, is recommended. At present the use of arsenicals is forbidden by law in the Canton of Zürich.

FERRIÈRE (C.) & KLÖTI-HAUSER (E.). **Appel en faveur de l'organisation en Suisse de la lutte contre les insectes nuisibles.**—*Schweizer Ent. Anz.*, i, no. 9, pp. 65–66. Zürich, 1st September 1922. [Received 7th July 1924.] [Also in German.]

This is an appeal for support in founding a Swiss society for combating injurious insects. It is only against *Phylloxera* that organised work is done in Switzerland, whereas many other insect pests require effective control.

K[LÖTI]-H[AUSER]. **Vorläufige Mitteilungen über meine diesjährigen Erfahrungen auf dem gebiete der Schädlingsbekämpfung.** [Preliminary Communications on my Experiences this year in Insect Control.]—*Schweizer Ent. Anz.*, i, nos. 11–12, pp. 73–74, 80–83. Zürich, November-December 1922. [Received 7th July 1924.]

The following are added to Dr. Jegen's list of fruit-tree pests that hibernate in orchards [*R. A. E.*, A, x, 281]: *Rhynchites interruptus*, Steph., *R. cupreus*, L., *Anthonomus cinctus*, Kollar (*piri*, Boh.), *Apion pomonae*, F., *Cheimatobia brumata*, L., *Enarmonia* (*Grapholitha*) *woeberiana*, Schiff., *Hyponomeuta malinellus*, Zell., *H. variabilis*, Zell., *Leucoptera* (*Cemiostoma*) *scitella*, Zell., *Aphis pomi*, De G., *A.* (*Dentatus*) *sorbi*, Kalt., *Myzus* (*Brachycaudus*) *amygdali*, Buckt., *M.* (*Myzoides*) *cerasi*, F., *Hyalopterus arundinis*, F. (*pruni*, F.), *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., *Eulecanium* (*Lecanium*) *persicae*, F., and *Lepidosaphes ulmi*, L. (*Mytilaspis pomorum*, Bch.).

Winter remedial measures are briefly reviewed. Besides winter measures arsenical sprays are noticed, because no conclusive experiments have as yet been made in Switzerland with these poisons and the local authorities hesitate to permit their use.

Klöti-Hauser (E.). **Die Bekämpfung der Weidenblattkäfer mit Arsenbrühen.** [Combating Willow-Leaf Beetles with Arsenic Sprays.]—*Schweizer Ent. Anz.*, ii, no. 1, pp. 5–6. Zürich, 1st January 1923. [Received 7th July 1924.]

Trials of lead arsenate and calcium arsenate against the willow-leaf beetle, *Phyllodecta vulgatissima*, prove that individuals that feed on poisoned foliage die within 8 days if a spray of 2 per cent. strength is used. There was no difference in the toxicity of lead or calcium arsenates, but the former is preferable in practice as it remains longer in suspension and adheres better.

Stäger (R.). **Ein Schädling der Himbeerkulturen.** [A Pest of Raspberry Plantations.]—*Schweizer Ent. Anz.*, ii, nos. 5–8, pp. 21–22, 25–26, 29–30, 33–35. Zürich, 1st May–1st August 1923. [Received 7th July 1924.]

Of recent years raspberries have been grown on a large scale in some localities in Switzerland, a crop worth £4,000 being harvested in one place during the summer. Early in 1920 a grower at Hallau reported that canes were being broken off, a mine being visible at the point of fracture. Investigation showed this to be due to the larva of a Buprestid, *Agrilus viridis*, L., that does not appear to have been recorded hitherto as a pest of raspberries. By autumn or early spring the larva reaches the end of its mine, hollows out a chamber and pupates. On 26th April 1921 the author noticed the first pupa and from then onwards all stages from larva to adult were found. Should *A. viridis* become a serious pest it may be combated by collecting and burning all infested canes in autumn. The larvae of a species of *Tetrastichus* are ectoparasites of the beetle larvae in their mines.

K[löti]-H[auser (E.)]. **Welche häufigen Erdfloh-Arten kommen als Kohlschädlinge in Betracht ?** [Which common Species of Flea-beetles need Consideration as Cabbage Pests ?]—*Schweizer Ent. Anz.*, ii, no. 12, pp. 53–54. Zürich, 1st December 1923. [Received 7th July 1924.]

In Switzerland the relative abundance of the flea-beetles injurious to cabbages may be represented by the following figures : *Phyllotreta cruciferae*, Goeze, 40 per cent. ; *P. undulata*, Kutsch., 40 ; *P. nemorum*, L., 10 ; *P. atra*, F., 5 ; and *P. nigripes*, F, 5. *Psylliodes chrysocephala*, L., is uncommon and usually occurs on rape.

Bouclier-Maurin (H.). **La Lutte contre l'Altise.**—*Rev. agric. Afr. Nord*, xxii, no. 256, pp. 415–416. Algiers, 27th June 1924.

Haltica ampelophaga has appeared in great numbers in Algerian vineyards, and every precaution should be taken to limit its spread. Natural enemies are fairly numerous, including the predator, *Zicrona coerulea* (blue bug). During the winter, all shelters likely to harbour the beetle should be destroyed. In the spring, larvae and adults should be collected as much as possible. The value of arsenicals in Algeria against this insect has been much discussed and seems rather doubtful ; sulphur dust when used in a heavy coating has prevented the development of many of the larvae.

Departmental Activities. Entomology.—*Jl. Dept. Agric. Union S. Africa*, viii, no. 6, pp. 545–547. Pretoria, June 1924.

The occurrence of *Cylas formicarius* (sweet potato weevil) has recently been recorded in Zululand. This weevil was recorded from Malvern, Natal, in 1897 and from Durban in 1902, and is, therefore, apparently of African origin and controlled there by natural enemies, which may explain its far greater importance as a pest in other countries.

Nymphs and younger stages of a Fulgorid or lantern-fly, probably of the genus *Uysanus*, have recently been found upon the ripening groundnuts of *Arachis hypogaea*. This record is of interest, as lantern-flies are not particularly common and very little is known of the earlier phases of their development.

In 1900 an unsuccessful attempt was made to introduce the Australian Coccinellid, *Cryptolaemus montrouzieri*, into the Cape Province to control mealybugs, but it did not become established, apparently owing to the fluctuations in abundance of the mealybugs. In 1923 another attempt at colonisation was made, and it is hoped to find a method of rearing the beetle on purely artificial foods in the laboratory. Slices of hard boiled egg seemed suitable, but the difficulty is to keep the food attractive, as when the surface becomes dry and hard the insects cannot feed, while if it is kept in moist chambers mould and bacteria develop very quickly.

Theron (J. J.) & Hall (T. D.). **The Toxicity of Locusts poisoned with Arsenical Baits.**—*Jl. Dept. Agric. Union S. Africa*, viii, no. 6, pp. 626–627. Pretoria, June 1924.

In view of the possible danger to animals from eating locusts poisoned with arsenic, the arsenic content of such locusts has been determined, as well as the minimum weight of arsenic required to kill adult cattle, horses and sheep. The weights of dry locusts that these animals would have to consume in a day for a toxic dose are shown in a table, from which it is obvious that unless an animal were to eat an enormous quantity (200–700 lb. for cattle), locusts poisoned according to prescribed directions would be safe for cattle, horses and sheep, and in all probability poultry. Pigs are very sensitive to most poisons, and such food should be used judiciously for them. The bait on which these tests were based consisted of 2 oz. sodium arsenite containing 80 per cent. white arsenic, 2 lb. sugar, 2 gals. water and ½-bag barley or bran. If the poison were used in higher concentration, or when locusts are sprayed with the solution, danger to animals might result.

Smee (C.). **Tobacco Beetle.**—*Nyasaland Prot. Dept. Agric.*, Circ. 4, 7 pp. Zomba, 1923. [Received 7th July 1924.]

The life-history and habits of the tobacco beetle [*Lasioderma sericorne*, F.] are described with reference to conditions in Nyasaland, where the average time occupied from oviposition to the emergence of the adult is from 70 to 90 days. Absolute cleanliness in and around all tobacco buildings is necessary in order to avoid infestation. All waste tobacco should be burnt or made to rot. Complete protection from infestation can be assured by the use of wire gauze doors and windows to a tobacco shed built with solid eaves. Baled tobacco at least should be stored in this manner, as the usual hessian covering is no protection against the beetle. The use of heat in infested premises

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is not satisfactory ; fumigation with hydrocyanic acid gas, although sometines very troublesome, is the only efficient means of dealing with heavily infested tobacco. Traps consisting of a few hands of tobacco suspended here and there in the building may be useful in cases where only a few beetles are present, but they must be destroyed and renewed at regular intervals or they will be worse than useless. Fly-papers hung near windows will destroy some of the flying beetles.

Bondar (G.). **Vaquinha do fumo** (*Epitrix parvula* **Fab.**). [The Tobacco Beetle, *E. parvula.*]—*Correio-agricola*, ii, no. 5, pp. 141–142, 1 fig. Bahia, May 1924.

Epitrix parvula, F., which is a well-known pest of tobacco and other Solanaceae in North America, was noticed for the first time in the State of Bahia, Brazil, in 1923. The measures advocated are those adopted in the United States, such as covering seed-beds with metal gauze and spraying with lead arsenate.

Bondar (G.). **A Cochenilla** *Saissetia oleae*, **Bern. Parasita da mandioca.** [*S. oleae*, a Pest of Cassava.]—*Correio-agricola*, ii, no. 5, pp. 142–143, 1 fig. Bahia, May 1924.

In the Brazilian State of Bahia cassava is infested by the scale, *Saissetia oleae*, Bern., which appreciably reduces the yield. The slips selected for planting should be sound and not visited by ants.

Chardón (C. E.). **La relación de ciertas yerbas con el matizado de la caña de azúcar.** [The Relation of some Grasses to the Mosaic Disease of Sugar-cane.]—*Rev. Agric. Puerto Rico*, xii, no. 5, pp. 305–314, 5 figs. S. Juan, P.R., May 1924.

As numerous experiments, by the author and others, have indicated that *Aphis maidis*, Fitch, is the vector of sugar-cane mosaic, it was decided to find out what common field grasses in Porto Rico are food-plants of this Aphid. Of the 12 grasses examined, *Eriochloa subglabra*, *Echinochloa colona*, *Eleusine indica* and *Syntherisma digitata*, are favourite food-plants of *A. maidis*, the tender leaves being usually preferred. On *E. subglabra* the Aphids shelter in the leaf-buds and are there tended by ants. It might be thought that if cane fields were kept free from grasses, the Aphids would be less numerous, but experiments show that this is not the case. The reason is that *A. maidis* infests maize and various grasses, but is naturally forced to sugar-cane if weeding is practised.

Wolcott (G. N.). **Annual Report of the Division of Entomology for the Fiscal Year 1922-23.**— *Ann. Rept. Insular Expt. Sta., Rio Piedras, Porto Rico, 1922–23*, pp. 51–57. S. Juan, P.R., April 1924.

The chief entomological problem in Porto Rico is the control of white grubs, of which *Lachnosterna portoricensis*, Smyth, is the most important in the eastern two-thirds of the island, *L. vandinei*, Smyth, being dominant in the western portion. Experiments with potassium cyanide and paradichlorobenzene are described ; with the former, using 100 lb. per acre, 80 per cent. of the 2nd instar grubs were killed ; the latter

proved too expensive for use save under exceptional conditions. The value of *Pyrophorus luminosus*, Ill., as a check to whitegrubs is discussed [*R. A. E.*, A, xii, 30].

Mosaic disease was successfully transmitted from diseased grass to sound sugar-cane in experiments with *Aphis maidis*, Fitch, as vector. Experiments with poisons against *Myrmelachista ambigua ramulorum*, Wheeler (coffee shade-tree ant) showed that neither sodium arsenate nor potassium ferro-cyanide was sufficiently toxic, but potassium cyanide was very effective at all strengths between 1 to 8 and 1 to 200. Other compounds of cyanide will be tried, as well as greater dilutions of potassium cyanide. Bees in the coffee groves were kept under observation, and the conclusion was reached that honey-bees do not injure the flowers or cause them to drop without setting fruit, as has been stated. No better remedy for *Cosmopolites sordidus*, Germ. (banana root-borer) has been found than the traps of freshly-cut corms; the indications are that collections must be continued for several months before much improvement in the appearance of the plants can be expected. *Phthorimaea operculella*, Zell. (tobacco leaf-miner) does not occur in the shade tobacco districts of the mountains, even in sun tobacco, nor at any point with abundant rainfall, but it is a serious pest in the drier sections of the island.

The spread of *Platyedra* (*Pectinophora*) *gossypiella*, Saund. (pink bollworm) on cotton is discussed [*R. A. E.*, A, xi, 545]. An outbreak of *Alabama argillacea*, Hb., which has not been noticed in Porto Rico for several years, occurred in some areas, but was checked by parasites, including *Apanteles aletiae*, Riley, which destroys the young larvae, and *Chalcis incerta*, Cress., and *Sarcophaga sternodontis*, Towns., which emerge from the pupae. The cotton-stainers, *Dysdercus andreae*, L., and *D. neglectus*, Uhler, did considerable damage to some fields of late planted cotton. The Eumolpid, *Metachroma antennalis*, Wse., was reported in June as injuring cotton, but in May 1923 an examination of the cotton fields failed to show any trace of it.

Modification of Cotton Regulations. Amendment No. 1 of Rules and Regulations Governing the Importation of Cotton and Cotton Wrappings into the United States.— *U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 30th April 1924.

This amendment to the Rules and Regulations for the importation of Cotton and Cotton Wrappings into the United States [*R. A. E.*, A, xi, 259] became effective 1st May 1924, and slightly modifies the conditions of disinfection.

Howard (N. F.). **The Mexican Bean Beetle in the East.**— *U.S. Dept. Agric.*, Farmers' Bull. 1407, 14 pp., 10 figs. Washington, D.C., May 1924.

An account is given of *Epilachna corrupta*, Muls. (Mexican bean beetle), as occurring in the south-eastern United States, where it is rapidly spreading northward. The spray recommended consists of 2 lb. magnesium arsenate per 100 U.S. gals. water to each acre, the spray being directed to the lower surface of the leaves, and the applications being made when the eggs become numerous, that is, when the plants begin to send out their true leaves. From one to four applications

should be given at intervals of a week or ten days. When spraying cannot be done dusting is advised [*R. A. E.*, A, xii, 165], and the usual general remedial practices are enumerated.

Russell (H. L.) & Morrison (F. B.). **Fortieth Annual Report of the Director, 1922-23.**—*Wisconsin Agric. Expt. Sta.*, Bull. 362, 115 pp., 40 figs. Madison, Wis., March 1924.

A cheap grasshopper bait that has proved very successful in Wisconsin consists of 85 lb. sawdust, 5 lb. white arsenic and 5 lb. salt, mixed dry, to which is added water to moisten, 15 lb. shorts being then thoroughly mixed in. It is possible that the bait may be further cheapened by the substitution of crude leach, a by-product of the smelting industry, for the white arsenic, but additional trials are necessary before it can be recommended.

As the canned pea industry depends largely on the crop of Wisconsin, the damage done by the pea aphis [*Acyrthosiphon pisi*, Kalt.] is a serious matter. Infestation usually begins on alsike or red clover and lucerne, the Aphids spreading to the pea fields in early June. Large numbers of them are destroyed by Coccinellids and birds. Observations are being made as to the susceptibility of different species of peas to attack. The experiments in dusting were continued from the previous year [*R. A. E.*, A, xi, 281], and a new kind of spraying boom that seems to promise well, but requires further trials, is described. Under good conditions from 70 to 85 per cent. of the Aphids were destroyed, but some of the dusts with a high calcium cyanide content were found to scorch the foliage. An attempt was then made to devise a machine for collecting the Aphids, and one was constructed, which is illustrated, and which collected as many as 86 per cent. when the speed of the paddles was sufficient to brush the insects from the plants. The advantages of such a machine are ease of manipulation, usefulness in all kinds of weather, and small expense, while the natural enemies of the Aphids, which are killed by the usual remedies, could easily be liberated from it. Observations showed that, though heavy rain may destroy large numbers of the younger insects, it is only a temporary check.

Experiments with remedies against the potato leafhopper [*Empoasca mali*, LeB.] showed that plots on which liquid spray was used gave a slightly higher yield than those that were dusted ; the cost of dusting was higher than that of spraying but the method was simpler and more rapid.

Glover (W. O.) & Glasgow (H.). **Cabbage Seedbed Diseases and Delphinium Root Rots : their relation to certain methods of Cabbage Maggot Control.**—*New York Agric. Expt. Sta.*, Bull. 513, 38 pp., 6 pls. Geneva, N.Y., February 1924.

It has been found that the various methods used with success against the cabbage maggot [*Phorbia brassicae*, Bch.] may produce an entirely different effect on the fungus, *Rhizoctonia solani*. For example, plants grown in seedbeds screened with cheese-cloth as a protection against the maggot frequently show signs of injury by the fungus, and tobacco dust, which is very efficient in preventing maggot injury, proved to be a good medium for the disease. Applications of a solution

of mercury bichloride successfully controlled the maggot and prevented the development of the fungus. This solution also controlled root rot of *Delphinium*.

A new Aphid on Citrus.—*Florida Ent.*, vii, no. 4, pp. 58–59. Gainesville, Fla., April 1924.

A new Aphid, previously thought to be *Aphis gossypii* or *A. citricola*, has seriously infested *Citrus* in Florida. Its rapid spread and the severity of the infestation suggest a recently introduced species. With the exception of the very first flush of growth in the early spring, in many groves all new growth has been completely prevented from expanding; a large proportion of fruit falls, particularly that from the later blooms, and practically all the remainder is rough and deformed. Natural enemies include Coccinellids such as *Hippodamia convergens* and *Chilocorus bivulnerus*, Syrphids, and a beetle, *Cyphon perplexus*. This Aphid differs from *A. gossypii* in the large proportion of winged adults, which are very active. [*Cf. R.A.E.*, A, xii, 405.]

Watson (J. R.) & Hubbell (T. H.). **On a Collection of Thysanoptera from Honduras.**—*Florida Ent.*, vii, no. 4, pp. 60–62. Gainesville, Fla., April 1924.

The thrips collected in Honduras during March–May 1923 include: *Heliothrips haemorrhoidalis*, Bch., and *Liothrips perseae*, Wats., on avocados, *H.* (*Selenothrips*) *rubrocinctus*, Giard, and *Franklinothrips vespiformis*, Crawf., on cacao, *Symphyothrips punctatus*, Hood & Williams, on coconuts, and *Dicaiothrips brevicornis*, Bagn., on soursop, cacao, grasses and vines.

Leach (B. R.), Fleming (W. E.) & Johnson (J. P.). U.S. Bur. Ent. **Soil Insecticide Investigations at the Japanese Beetle Laboratory during 1923.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 361–365. Geneva, N.Y., June 1924.

Experiments have been made in the chemical treatment of soil around the roots of conifers, boxwoods, rhododendrons, ferns, blueberries, etc., for the control of the soil-living stages of *Popillia japonica* (Japanese beetle). Emulsions of carbon bisulphide and wormseed oil proved satisfactory and are now in general use by nurserymen. In the case of ericaceous plants, which prefer an acid soil containing an abundance of peat, it was found that the amount of emulsified carbon bisulphide necessary to kill all insects depended on the amount of organic matter present, and that in every case the plant had greater resistance than the insect. Experiments in dipping large balls of soil were largely negative, though the dipping method was found distinctly valuable in the case of ornamental plants with matted and hollow roots, where only small amounts of soil are present. Carbon bisulphide emulsion was used for peonies, and wormseed oil emulsion for iris, phlox, etc. As large acreages are used for growing plants of this type, the method will probably have a large application.

Experimental work during the last three years indicates that soil treated with acid lead arsenate at the rate of 1,500 lb. per acre, the material being thoroughly worked into the soil to a depth of 4 in., will kill the larvae present within two weeks, depending upon the soil

temperature. Although the majority of plants are very sensitive to arsenic, several of those tried would grow in soil treated as above, as well as in untreated soil.

Jaynes (H. A.) & Gardner (T. R.). U.S. Bur. Ent. **Selective Parasitism by *Tiphia* sp.**— *Jl. Econ. Ent.*, xvii, no. 3, pp. 366–369. Geneva, N.Y., June 1924.

The following is taken from the author's abstract of this paper :— During the past several years the larvae of *Ochrosidia immaculata* had become very numerous on a golf course in the vicinity of Moorestown, New Jersey. Within the past two years the abundance of the larvae was reduced approximately 93 per cent. by a native species of fossorial wasp belonging to the genus *Tiphia*. In the same manner the parasite increased in numbers, and as the abundance of the host was reduced the numbers of the parasite decreased nearly 95 per cent. At the same time a related Scarabaeid, *Popillia japonica*, became very numerous in the locality. Under conditions in the field only two larvae of *Popillia* were found to be successfully parasitised by the native *Tiphia*. Experiments indicated that the female *Tiphia* deposited her eggs, by preference, on the larvae of *Ochrosidia* rather than on those of *Popillia*. The life-histories of *O. immaculata* and *P. japonica* are similar in this region, but the former larvae are larger than the latter when both are full-grown. Nevertheless during the latter part of August, when the parasites are present, many *Popillia* larvae have reached the third instar in their development ; while many *Ochrosidia* larvae are in the second instar and are smaller than the *Popillia* larvae that have reached the third stage.

It is evident that, at present, this species of *Tiphia* is selective in its preference for its native host ; but since some individuals are able to develop successfully on the larvae of *Popillia*, it is possible that it may develop a strain that will become parasitic on the introduced species.

Severin (H. H. P.). **Natural Enemies of Beet Leafhopper (*Eutettix tenella*, Baker).**— *Jl. Econ. Ent.*, xvii, no. 3, pp. 369–377. Geneva, N.Y., June 1924.

The natural enemies of *Eutettix tenella*, Baker, include a large number of insects predacious on the nymphs and adults, and seven species of egg parasites. Those recorded by the author are *Polynema eutettixi*, Gir., *Anagrus giraulti*, Craw., *Aphelinoidea plutella*, Gir., and *Anthemiella rex*, Gir., reared in greater numbers from eggs deposited by the host on saltbushes (*Atriplex*) than on sugar-beet in the San Joaquin Valley.

Two flies, *Pipunculus vagabundus*, Knab, and *P. industrius*, Knab, deposit their eggs in the nymphs or adults of the host, the larvae feeding within the abdomen of the latter. They emerge when full-grown at the junction of the metathorax and abdomen, after which the host dies. Pupation occurs in the soil and lasts about 22 days. A single female of the Dryinid, *Gonatopus contortulus*, Patton, will kill most of the leafhoppers in a cage, but only deposits its eggs on an occasional leafhopper. The presence of the parasite in its later development can be determined by the dark brown sac, external in the nymph or

beneath the wings in the adult leafhopper. After leaving the host the parasitic larva spins a cocoon on the foliage of the saltbush or beet.

The greatest amount of parasitism occurs during August (31·5 per cent.). The weak point in the parasitism of the adults occurs on the plains and foothills. Dissections show that only those winter brood adults that are parasitised by a tiny larva fly to the foothills, resulting in an extremely low percentage of parasitism of the spring brood.

If the distribution of *E. tenella* from Washington and Idaho south into Mexico represents the native home of this insect the natural enemies cannot be considered as affording efficient control. The possibility that it was introduced into Argentina in connection with sugar-beet and stock-beet is not considered plausible, and the transportation of eggs on vegetation in cold storage is considered unlikely. It does not seem possible, however, that its natural range can extend from Washington and Idaho south through the tropics into Argentina. If accidentally introduced it could have established itself easily on plants of the family Chenopodiaceae to which the sugar-beet belongs. A brief statement concerning the geographical distribution of the species of *Atriplex* and *Chenopodium*, prepared by Dr. H. M. Hall, is included. The present known distribution of *E. tenella* corresponds with the geographical range of the stork's-bill (*Erodium cicutarium*), the most important winter food-plant, in which the dark overwintering adults deposit their eggs and on which the spring brood develops in California. The possibility of *E. tenella* having been introduced into America from Europe with this plant is out of the question, as the stork's-bill was introduced from the Mediterranean basin through the seed carried in the wool of sheep. A study of the geographical distribution of *E. tenella* should be underaken, and should it be shown that it has established itself, by migratory flights, outside the range of efficient parasites every attempt should be made to introduce parasites into such natural breeding places.

The importance of a careful study of the habits of the parasites and their requirements before their introduction into fresh localities is emphasised.

Graham (S. A.). **Temperature as a limiting Factor in the Life of Subcortical Insects.**— *Jl. Econ. Ent.*, xvii, no. 3, pp. 377–383. Geneva, N.Y., June 1924.

The distribution of insect species within a log depends to a very large degree upon the temperature in different parts of the log. The most heat-resistant groups, represented by the genus *Chrysobothris*, are only found in the warmer parts, the less resistant species occurring only where the temperature is not extremely high. On this basis of temperature the insects inhabiting logs may be divided into several ecological groups. The representatives of these groups chosen for the present study are *Ips pini*, Say, *Monochamus scutellatus*, Say, and *Chrysobothris dentipes*, Germar. Factors influencing the subcortical temperature in logs are discussed [*cf. R. A. E.*, A, xii, 57], and the effect of high temperatures on the above named species is described. The average death temperatures for these adults are 48°, 47° and 50°C. [118·4°, 116·6° and 122°F.] respectively, but there is also considerable individual variation. If it were not for these erratic individuals, adaptation of a species to new or changed environmental conditions would be difficult if not impossible.

JOHANNSEN (O. A.). **A Method for the Extermination of the Round-headed Apple-tree Borer.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 383–386. Geneva, N.Y., June 1924.

A new method for the control of the round-headed apple-tree borer [*Saperda candida*, F.] is described in detail, the following being the author's summary :—As a substitute for the "digging-out" process, fumigation with carbon bisulphide proved very successful. Against the tree, with the open side over the borer holes, a cell with open top, resembling a large mud wasp's nest, is built of plastic clay or mud. A teaspoonful of carbon bisulphide is poured in, and the cell closed with a plug of clay. The surface of the cell is then wetted and smoothed down, and carefully sealed to the tree and the earth. This method gives 100 per cent. control when properly done, requires less time than the "digging-out" process, and neither mutilates nor injures the tree.

WEIGEL (C. A.) & BROADBENT (B. M.). U.S. Bur. Ent. **Lubricating-oil Emulsion as a Control for** *Chrysomphalus aonidum* **in Greenhouses.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 386–389. Geneva, N.Y., June 1924.

Experiments for the control of *Chrysomphalus aonidum*, L., with lubricating oil emulsions carried out during 1922 and 1923 are desscribed. A number of infested plants were used, including *Kentia* palms, *Phoenix rupicola*, *Aspidistra lurida*, *Ficus elastica*, *Laurus nobilis*, *Aucuba japonica* and *Citrus* sp. The formulae applied were the boiled emulsion, consisting of 2 U.S. gals. paraffin oil, 1 U.S. gal. water and 2 lb. potash fish-oil soap, and the cold-stirred emulsion, consisting of paraffin oil and water as above but with 8 lb. potash fish-oil soap. In each case the stock emulsions were diluted 1 : 50 (or $1\frac{1}{3}$ per cent. oil). With greater strengths the foliage was left greasy, and the palm fronds turned yellow. One application of the boiled emulsion 1 : 50, provided it is thoroughly done, will give satisfactory control without injury to hardy ornamental greenhouse plants. Preliminary tests indicated that the cold-stirred emulsion was about equally effective.

PHIPPS (C. R.). **A Stilt-bug,** *Jalysus spinosus* **Say, destructive to the Tomato.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 390–393, 1 pl. Geneva, N.Y., June 1924.

The following is the author's abstract of this paper :—A stilt-bug, *Jalysus spinosus*, Say, is recorded as a serious pest of the tomato in Missouri. It is distributed from Maine to the Rocky Mountains and commonly occurs on the undergrowth of oak woods. It causes the blossoms to wither and drop, preventing the plants from setting fruit. The life-cycle, appearance, nature of injury, and control measures are briefly discussed.

The nymphs of this Neidid may be killed and the foliage protected from subsequent attack by the application of nicotine sulphate and Bordeaux mixture as soon as migration to the tomato is noticed. A second application should be made early in August, when the majority of the first brood nymphs are present.

Jones (T. H.) & Bradley (W. G.). **Certain Wild Grasses in Relation to Injury to Corn by the "Borer"** (*Diatraea saccharalis* **Fab.**) **in Louisiana.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 393–395. Geneva, N.Y., June 1924.

The following is the author's abstract of this paper: Maize grown in Louisiana is often severely injured by the sugar-cane moth-borer, *Diatraea saccharalis*. Ten stalks in a very heavily infested field gave an average of 46·2 larvae, pupae, and pupal cases to the stalk. Larvae have been found, especially during the autumn and winter, in several wild grasses (*Panicum*, *Paspalum*, etc.). Some of these grasses grow abundantly in areas where the borer causes so much damage to maize. It seems certain that severe injury to the maize is due to moths that fly to it upon issuing from these grasses in the spring.

Robinson (R. H.). **The Use of Skim Milk in the Preparation of certain Spray Materials.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 396–400. Geneva, N.Y., June 1924.

The advantages of using skim milk or milk powder in the preparation of certain sprays are discussed. A method is outlined for its use in preparing a substitute for the different sulphur sprays used as summer fungicides, and also as an emulsifier for mineral oil. As a result of laboratory observations of many varied combinations the following formula is recommended :—4 U.S. gals. mineral oil, 1·5 U.S. gals. water, 1·5 U.S. qts. milk and 2 oz. hydrated lime. The milk is added to the water, and the hydrated lime or slaked quick lime stirred in the diluted milk. This is then poured into the oil and the mixture pumped back into itself for a minute and finally pumped into another container, using as high a pressure as possible, and with the opening in the nozzle reduced so as to produce a fine spray. It should then be pumped back again. Hydrated lime is used to neutralise the acid reaction of the milk and to dissolve the casein; sodium or potassium hydroxide or sodium carbonate may be substituted, though the lime is preferable, particularly if hard water is used. If the water is very hard the amount of lime may have to be increased. Whole milk or milk powders may be substituted for the skim milk. Dried milk should be used at the rate of 2·5 oz. for each quart of milk required.

Good emulsions were obtained with several grades of mineral or lubricating oil, red engine oil being recommended on account of its low cost. The light and medium grade will give best results. Of the various materials tested, commercial cresylic acid, sheep dip, beechwood creosote, and creosote oil apparently improved the emulsifying powers of milk and calcium caseinate. It is recommended that about an ounce of commercial cresylic acid be added to the water in the formula given above.

Skim milk or skim milk powder used in proper amounts is as good a spreader as calcium caseinate, and may be obtained for less than one-third the cost. Three U.S. qts. of skim milk or 7 oz. of the powder is the average amount to be added to 100 U.S. gals. of spray, and about half this amount is the minimum that should be used. Two to 8 oz. of hydrated lime, depending upon the spray and the age of the milk, should be added to the latter. The milk is introduced into the spray tank nearly filled with water, the spray material itself being added last.

Vickery (R. A.). U.S. Bur. Ent. **The Striped Grass Looper,** *Mocis repanda* **Fab., in Texas.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 401–406, 1 pl. Geneva, N.Y., June 1924.

Remigia punctularis, Hb. (*Mocis repanda*, auct.) has long been known as a serious pest of crops in tropical America and is occasionally injurious in southern Texas. In addition to maize, sugar-cane and Bermuda grass (*Cynodon dactylon*), the larvae fed on *Cenchrus viridis*, *Trichloris pluriflora*, *Eriochloa punctata*, *Leptochloa nealleyi* and *Panicum fasciculatum*, the latter being apparently the preferred food-plant.

Under laboratory conditions the life-cycle from the time the eggs were laid to the appearance of the adults occupied 36 days during October and November, at an average daily mean temperature of 76°F. The eggs are laid singly and hatch in from 5 to 7 days, the entire larval stage lasting 21 days. The average duration of the pupal stage was 12 days, varying from 10 to 15. No parasites were reared during these observations; those previously recorded are quoted, as are also the remedial measures [*R.A.E.*, A, ii, 519].

Franklin (H. J.) & Lacroix (D. S.). **The Spotted Cutworm,** *Agrotis c-nigrum* **(L.), a Cranberry Pest.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 406–408. Geneva, N.Y., June 1924.

Agrotis c-nigrum, L., was particularly injurious during the summer of 1923 on several cranberry bogs in south-eastern Massachusetts. The infestation developed quickly, and most of the crop on the infested areas was destroyed before treatment could be applied to advantage. The first indication of the work of the pest was the sudden disappearance of the blossom and the number of fallen green leaves found in the bog ditches. It is evident that damp soil in late May and early June encourages infestation, probably because the moths prefer to lay their eggs in damp or slimy earth. The attack is very slight except where the winter water is held until late May. In the bogs pupae were found at depths of from 1 to 4 inches and in the rearing cans about 3 inches below the soil surface. The time spent as a pupa varied from 17 to 24 days, with an average of 19. Adults began to emerge in confinement about 20th August, continuing until nearly the middle of September, but they died rapidly without laying eggs. In one case an individual was kept alive by feeding it with sugar solution, and several eggs were laid on sand and on the sugar container on 15th September. They hatched on 29th September, but the larvae did not survive the first instar, refusing to feed on clover, newly sprouted maize, ferns or cranberry leaves. No adults were seen in the infested bogs. Of the larvae collected in the field 70 per cent. contained eggs of Dipterous parasites, of which the red-tailed Tachinid, *Winthemia quadripustulata*, F., was most abundant, 65 per cent. of the larvae being parasitised by this fly alone. Other parasites reared were *Phorocera claripennis*, Macq., *Amblyteles seminiger*, Cress., and *Euplectrus bicolor*, Swed., the latter being an important parasite of cutworms in Europe and apparently recorded for the first time from North America.

Larvae of *Agrotis ypsilon*, Rott. (greasy cutworm) were found occasionally with those of *A. c-nigrum*, but when confined they devoured the latter.

Mosher (F. H.) & Holbrook (J. E. R.). **A Device for inflating Larvae.**— *Jl. Econ. Ent.*, xvii, no. 3, pp. 408–411, 1 pl. Geneva, N.Y., June 1924.

A rather elaborate device for inflating Lepidopterous larvae is described and illustrated; it provides a steady supply of air pressure and a sufficient adjustable amount of heat. Its use has greatly increased the quantity as well as the quality of the specimens prepared, and an operator can easily inflate 50 full-grown larvae of the gipsy moth [*Porthetria dispar*] in a day, and more than that if the larvae are smaller or thin-skinned.

Wehrle (L. P.). **Notes on the Pear Midge** (*Contarinia pyrivora*).— *Jl. Econ. Ent.*, xvii, no. 3, pp. 411–414. Geneva, N.Y., June 1924.

Pears infested by *Contarinia pyrivora*, Riley, have black spots and holes on the outside, and become hollow, discoloured and soft on the inside. Several badly infested trees were found at Ithaca, N.Y., on 26th May 1922, at which time some of the larvae were already full-grown and had left the fruit. On 30th August cocoons were found about one-half to an inch below the soil surface under the infested trees. In the case of 100 larvae taken from pears on 26th May and kept on moist soil, pupation began in very late August or early September and continued until early October. One individual was undergoing the process as late as 27th November.

McAtee (W. L.). **Mullen Rosettes as Winter Shelters for Insects.**— *Jl. Econ. Ent.*, xvii, no. 3, pp. 414–415. Geneva, N.Y., June 1924.

The common mullein (*Verbascum thapsus*) by the nature of its winter growth forms a very suitable shelter for many insects. A list is given of those collected on it in Maryland from 25th November 1914 to 5th April 1915.

Danforth (R. E.). **Notes on the Life History of** *Disonycha laevigata* **Jacoby in Porto Rico.**— *Jl. Econ. Ent.*, xvii, no. 3, pp. 415–416. Geneva, N.Y., June 1924.

Disonycha laevigata, Jac., is a serious pest of cultivated plants, particularly beets, in Porto Rico [*R.A.E.*, A, xii, 2]. The eggs are either glued to the underside of the leaves or deposited on the soil near the stem of the plant. The larvae hatch in from 4 to 7 days, and feed on the leaves, but when the latter are disturbed they fall to the ground. The larval stage lasts from 11 to 14 days, the prepupal stage 1 day, and the pupal stage 7 days. The latter is spent underground. The adults also feed on the leaves. The life-cycle from the newly hatched egg to the adult is usually 26 days.

Simmons (P.). U.S. Bur. Ent. **Hydrocyanic Acid retained by fumigated Cheese.**— *Jl. Econ. Ent.*, xvii, no. 3, pp. 416–417. Geneva, N.Y., June 1924.

In view of the recent recommendation of hydrocyanic acid gas for the fumigation of cheese [*R.A.E.*, A, xi, 95], several preliminary tests have been made by the author in connection with his work on *Piophila casei*, L. (cheese skipper), the results of which are described.

On account of the resistance of the larvae to the gas, dosages up to and including 1 oz. per 100 cu. ft. would be largely wasted. It would not be safe to assume that all cheeses in a given room were protected by an unbroken coating of paraffin, and in view of the very evident tendency of cheese to retain the poisonous acid, cyanide fumigation is not recommended, at least until further tests have been made to disprove the danger of its application.

WAGONER (C. C.). **Calcium Cyanide Dust for Rosy Apple Aphis.**—*Jl. Econ. Ent.*, xvii, no. 3, p. 417. Geneva, N.Y., June 1924.

Calcium cyanide at the rate of 25 per cent. to 75 per cent. talc was applied on 21st June to ten 25-year-old apple trees infested with *Aphis sorbi* in New York. The temperature at the time of application was 92°F., and the relative humidity 85 per cent., with south-west winds at about three miles an hour. After each application the trees were shaken to dislodge the insects, those caught on sheets under the trees including *A. sorbi*, ants, bees and rose leaf beetles [*Nodonota puncticollis*]. The average quantity on a sheet measuring 7 by 3 ft. was upwards of three cubic inches of insects. Later examination of the trees revealed no injury to either fruit or foliage as a result of the applications. All the insects were apparently dead 10 hours after the application.

FLANDERS (S. E.). **A New "Canker-Worm."**—*Jl. Econ. Ent.*, xvii, no. 3, p. 418. Geneva, N.Y., June 1924.

Over 40 acres of walnut trees in California were defoliated in the spring of 1923 by the larvae of the Geometrid, *Coniodes plumogeraria*, Hulst. Pupation occurs in the ground, and there is apparently only one generation a year. The moths began emerging about the middle of February, and the eggs hatched in the middle of March. Most of the eggs were deposited on twigs killed the previous seasons. A brief description is given of the different stages. It is noteworthy that the infested orchard was some distance from any native growth, and intervening orchards were apparently free.

GUTHRIE (J. E.). **Woodpeckers and Smartweed Borer.**—*Jl. Econ. Ent.*, xvii, no. 3, pp. 418–419. Geneva, N.Y., June 1924.

Downy woodpeckers (*Dryobates pubescens medianus*) were found to be destroying about 90 per cent. of the larvae of *Pyrausta ainsliei*, Heinr. (smartweed borer) in maize stalks in Iowa in February 1924, when two or three acres on rather low ground were heavily infested. It is suggested that, in view of the similarity of the habits of *P. ainsliei* and the European corn borer [*P. nubilalis*, Hb.], these birds may be worth encouraging where the latter pest is abundant.

SULLIVAN (K. C.). **The Pickle Worm and its Control.**—*Missouri Agric. Expt. Sta.*, Circ. 122, 4 pp., 2 figs. Columbia, Mo., June 1924.

During 1923 the cantaloup crop in south-east Missouri was practically destroyed by *Diaphania nitidalis*, Stoll. An account is given of its life-history, the damage it causes and the remedial measures to be adopted [*R.A.E.*, A, i, 218; ii, 120; viii, 366].

Speare (A. T.) & Yothers (W. W.). **Is there an entomogenous Fungus attacking the Citrus Rust Mite in Florida ?**—*Science*, lx, no. 1541, pp. 41–42. Garrison, N.Y., 11th July 1924.

The citrus rust mite, *Eriophyes* (*Phyllocoptes*) *oleivorus*, Ashm., is most numerous in Florida just after the beginning of the rainy season, at the end of June or early in July, when a single grapefruit [*Citrus decumana*] may be infested with more than half a million mites ; but soon after this time they disappear, and by the end of September it is nearly impossible to find any. This disappearance is believed to be due to a fungus disease. Generally the mites attacked by the disease congregate on a small area of the fruit in direct sunshine, contrary to their usual habits, as they prefer a shaded position. Most of the adults change from a lemon-yellow to a darker shade. Fungous filaments are found protruding from the bodies of the dead mites, and generally fungous bodies also inside them. These have also been observed in living mites that have changed colour and become sluggish in movement.

It is found that rust mites are always more abundant on trees sprayed with fungicides than on unsprayed trees. The spraying evidently eliminates the disease.

Quarantine Department. Principal Pests intercepted during the Quarter ending March 31st 1924.—*Qtrly. Bull. State Plant Bd. Florida*, viii, no. 3, p. 96. Gainesville, Fla., April 1924.

The principal pests intercepted were *Aleurocanthus woglumi*, Ashby, from Cuba and the Bahamas, *Coccus viridis*, Green, from Cuba, and *Pseudaonidia paeoniae*, Ckll., from South Carolina.

A new Aphid attacking Citrus.—*Qtrly. Bull. State Plant Bd. Florida*, viii, no. 3, pp. 93–94. Gainesville, Fla., April 1924.

An Aphid, not yet identified, is reported for the first time infesting citrus trees in Florida, where it is spreading rapidly [*cf. R.A.E.*, A, xii, 397]. The insect attacks the young growth particularly, curling the leaves, and causing protuberances on the rind of the fruit, which sometimes falls from the trees. This Aphid has been found to infest all varieties of *Citrus*, but is especially injurious to mandarins [*C. nobilis*], preferring next the sweet orange and lastly grapefruit [*C. decumana*]. It has been found on loquats [*Eriobotrya japonica*], nightshade, Mexican rose [*Portulaca grandiflora*], Jerusalem oak [*Chenopodium botrys*], milk-weed, dog-fennel [*Anthemis cotula*], and cudweed. The most important predacious enemies of the Aphid are four species of Coccinellids and the larvae of Syrphids and lace-wing flies. These, however, are not yet in sufficient numbers to be effective. Dusting the trees with tobacco extract and tobacco dust is the best means of mechanical control. Calcium cyanide gives satisfactory results when used in tents. Various sprays used against other insects are of value, the best being lime-sulphur solution used against rust mites [*Eriophyes oleivorus*], which is effective against the Aphid if nicotine sulphate, 1 : 800, is added.

Patch (E. M.). **Insects, Arachnids and Chilopods of the Pribilof Islands, Alaska : Homoptera.**—*North Amer. Fauna*, no. 46, pp. 143–144, 1 pl. Washington, D.C., 1923. [Received 18th July 1924.]

Macrosiphum constrictum, sp. n., is described from the Pribilof Islands from *Pedicularis*. Some individuals escaped from the laboratory to a lettuce bed where they multiplied rapidly.

Hopping (R.). **Yellow Pine** (*Pinus ponderosa*) **as a Host in British Columbia.**—*Canad. Ent.*, lvi, no. 6, pp. 125–128. Orillia, Ont., June 1924.

In British Columbia the bark-beetles responsible for killing the yellow pine (*Pinus ponderosa*) are *Dendroctonus monticolae* and *D. brevicomis*. In order to determine the numbers of these beetles, as well as of secondary bark-beetles, species of *Ips* (almost all *I. interpunctus*), *Pityogenes carinulatus* and *Orthotomicus ornatus*, that may be obtained from a yellow pine tree, pines were caged by being cut and tightly enclosed in white dairy cloth. The construction of the cage is described. It was found that the smaller the tree, the greater was the proportion of *D. monticolae* emerging, and the larger the tree, the greater the proportion of *D. brevicomis*. Tables given show the numbers of beetles obtained in this way during 1921-1923 at different times of the year, and the conclusion is reached that it is not advisable to carry out much control work later than 20th June in ordinary seasons in British Columbia.

When the stump, trunk, top and limbs of the trees were caged separately, nearly all the beetles were found to emerge from the stump and trunk. On carrying over to a second year the caging of one of the trees, it was found that the emergence of the species of *Dendroctonus* was $5\frac{1}{2}$ per cent. of that of the first year, but the stump was not included. The numbers of beetles emerging on hot, sunny days were considerably greater than on dull, cloudy ones.

The number of Hymenopterous and Dipterous parasites obtained was unexpectedly large, while that of predacious beetles, such as Clerids and *Temnochila chlorodia* was very small.

Swaine (J. M.). **New Species of the Genus** *Phloeosinus* **Chapuis.**—*Canad. Ent.*, lvi, no. 6, pp. 144–149. Orillia, Ont., June 1924.

The new species of *Phloeosinus* described are *P. rubicundulus* from *Sequoia gigantea*, *P. antennatus* from *Librocedrus*, *P. fulgens* from *L. decurrens*, and *P. russus*, all from California, *P. nitidus* from Oregon, and *P. scopulorum* from *Juniperus scopulorum* in British Columbia.

Hood (J. D.). **A new** *Sericothrips* **(Thysanoptera) injurious to Cotton.**—*Canad. Ent.*, lvi, no. 6, pp. 149–150. Orillia, Ont., June 1924.

Sericothrips gracilipes, sp. n., is described from 11 females and 2 males from Mexico, and, with somewhat larger numbers of *Heliothrips phaseoli*, Hood, is stated to cause "bronze" or "copra" on cotton leaves, rendering thousands of acres of cotton worthless.

Schaus (W.). **A new Moth injurious to Cocoanut Palm (Lepidoptera : Limacodidae).**—*Proc. Ent. Soc. Wash.*, xxvi, no. 6, p. 180. Washington, D.C., June 1924.

Natada urichia, sp. n., is recorded as injurious to coconut palms in Trinidad.

Bourne (B.A.). **Entomological and Mycological Work carried out during the Season under Review.**—*Rept. Dept. Agric., Barbados, 1922–23*, pp. 8–9. Barbados, 1923.

Both *Diaprepes abbreviatus*, L., and *Lachnosterna smithi*, Arr., have caused considerable damage to sugar-cane in certain districts, but most of this could have been avoided by proper crop rotation. In experiments with fumigation the average number of grubs to a stool three weeks after application of 1 oz. carbon bisulphide per stool was 5·2, against 11·8 in untreated stools ; but the cost of treatment would probably be rather prohibitive.

Diatraea saccharalis, F., was prevalent, as usual, the egg parasite, *Trichogramma minutum*, Riley, being still [*R.A.E.*, A, xi, 162] unable to check the borer, and the black egg parasite, *Prophanurus alecto*, Crawf., being even less efficient. An effort has been made to introduce larval parasites from Demerara, including *Iphiaulax medianus*, Cam., and *Iphiaulax* sp.

Malpighia glabra was seriously affected by *Pulvinaria pyriformis*, Ckll., and *Orthezia praelonga*, Dougl. ; *Thrinax* sp. was attacked by *Aspidiotus destructor*, Sign., and *Chrysomphalus aonidum*, L. ; and the stems of *Gossypium* sp. were sometimes covered with *Diaspis pentagona*, Targ. (*amygdali*, Tryon).

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxi, no. 5, pp. 354–356. Brisbane, May 1924.

The breeding of Scoliid wasps of the genus *Campsomeris* has been continued, the present season being particularly favourable for this class of control work, as the grubs of *Lepidiota frenchi*, Blackb., and of *Lepidoderma albohirtum*, Waterh., favourite hosts of the parasite, are available. The Tachinid parasite[*Ceromasia sphenophori*, Vill.] of the weevil borer of sugar-cane [*Rhabdocnemis obscura*, Boisd.] from New Guinea is being bred and liberated in Queensland with encouraging results. Various laboratory experiments carried out to determine how long a third-stage grub of *L. albohirtum* could remain alive under water demonstrated that the longest time of submergence after which the larvae revived was 47 hours ; but after this length of time none of the larvae lived more than three days.

The larvae of *L. albohirtum* remain among the roots of the stool under which the eggs were deposited, and do not move from one line of stools to another as has been sometimes supposed.

Dormer (W. C.). **Sugar Pests and Diseases in the Mackay District.**—*Queensland Agric. Jl.*, xxi, no. 5, pp. 363–368. Brisbane, May 1924.

Sucking insects, important as potential disease carriers, observed on sugar-cane in the Mackay District included the leaf-hoppers, *Perkinsiella saccharicida* and *Astorga saccharicida*, *Neomaskellia* (*Aleurodes*) *bergi*,

Pseudococcus calceolariae, Sardis sp., and *Phaenacantha* sp. Large numbers of an Acarid mite were seen below the cane leaf-sheaths. The grey-back cane grub, *Lepidoderma albohirtum,* was fairly generally distributed, the worst damage done being invariably in the loose soil of the creeks and river flats. Fumigation with carbon bisulphide destroyed 80 per cent. of the grubs. Cutting down the trees on which the beetles feed minimises infestation to a great extent.

Other pests of cane doing a certain amount of damage included the moth borer, *Phragmatiphila truncata,* the beetle borer, *Rhabdocnemis obscura,* wireworms (*Monocrepidius* sp.), for which lime might be a good repellent, termites, the army worm, *Cirphis unipuncta, Melanitis leda,* the larvae of which usually feed on grass, but sometimes on cane leaves, *Lepidiota frenchi,* another species of *Lepidiota* and *Horonotus optatus,* both recorded for the first time on sugar-cane, *Gonocephalum* sp., a Dynastid beetle, *Pentodon australis,* which is attracted to light, grasshoppers, and moths of the genera *Cosmopteryx* and *Opogona.* The natural enemies of cane pests included *Tiphia* sp., *Asilus illingworthi,* and various birds.

Froggatt (J. L.). **Banana Weevil Borer** (*Cosmopolites sordidus,* **Chev.). vi.**—*Queensland Agric. Jl.,* xxi, no. 5, pp. 369–378, 2 pls. Brisbane, May 1924.

The Sixth Progress Report on the banana weevil borer records further observations [*R.A.E.,* A, xi, 64, 277, 473, etc.] on *Cosmopolites sordidus,* Germ. The number of eggs deposited in 1923 showed fluctuations throughout the year similar to those previously recorded. The longest life-cycle period (oviposition to emergence of adult) noted was 159-165 days from eggs laid in April-May. Various tests were undertaken to ascertain the powers of the insect to maintain life without food, and also the effect on the beetles of excessive moisture. Tables are given showing the detailed results of these tests. The longest time noted of existence without food was 121 days; but since, under natural conditions, the length of life may be longer than in the laboratory, a full year should be allowed between digging out infested stools and replanting. Further work on the effect of poisons on the beetle shows Paris green (copper aceto-arsenate) to be still the most satisfactory, the procedure being the same as that already given [*R.A.E.,* A, xi, 64], with sodium arsenite next, followed by arsenic trioxide and borax. Calcium arsenate gave fair results. A summary is given, in tabular form, of laboratory results of poisons at different periods of the year. Chemicals in solution are still found unsatisfactory [*R.A.E.,* A, xi, 473], dry powders being more effective.

Observations are recorded showing that the beetles do fly [*cf. R.A.E.,* A, xii, 359] at night under certain undetermined conditions during the summer months, and this must be regarded as a potential menace.

Jarvis (H.). **Fruit Fly Investigation.**—*Queensland Agric. Jl.,* xxi, no. 5, pp. 382–385. Brisbane, May 1294.

The fruits chiefly attacked in February 1924 by the fruit-fly, *Dacus ferrugineus* (*Chaetodacus tryoni*), were late peaches, pears, apples and quinces, but in March the fly, which was very numerous, was observed ovipositing in other fruits, both wild and cultivated, such as blackberries, Cape gooseberries [*Physalis peruviana*], tomatos and in large

numbers on grapes. In grapes, however, the flies seldom reach maturity, the fermenting juice rapidly destroying the larvae. Drowning, as an alternative to boiling, is suggested as a safe and effective way of destroying the eggs and larvae in fruit. A little kerosene poured on the water would kill any larvae that came to the surface.

A new fruit-fly from cultivated fruits, first taken as an adult in 1921, has since been bred from pear and quince. It apparently does not hibernate in the Granite Belt, as it never appears till the end of February; if it passed the winter as a pupa, it would almost certainly appear in spring or early summer.

Aphelinus mali, the parasite of the woolly apple aphis [*Eriosoma lanigerum*] is apparently established in at least one orchard, and further supplies of the parasite are awaited.

Much damage was caused by the codling moth [*Cydia pomonella*] during February and March. The cleaning up of packing sheds is of the greatest importance; boiling water poured into cracks and crevices will kill all sheltering larvae.

The tomato caterpillar, *Heliothis* (*Chloridea*) *obsoleta*, has also done considerable harm. The eggs are laid singly on the young leaves or flowers, the larvae feeding externally on the leaves until they are about three parts grown, when they eat their way down into the fruit. They burrow in the soil to pupate. The pest is kept in check by parasites, a small Braconid that lays its eggs in the caterpillar being the most important. A Bombyliid fly and a species of Tachinid also oviposit on the caterpillars. The infested fruit should be picked off and destroyed. Spraying the plants early in the attack with lead arsenate, 2 lb. paste or 1 lb. powder to 50 gals. water, is beneficial.

The scale-insects that have been noted are *Aspidiotus perniciosus*, doing considerable damage to plum and apple trees, and *Saissetia* (*Lecanium*) *oleae* on pear, apricot and hazel-nut trees and *Eulecanium* (*L.*) *berberidis* on vines, neither doing much damage.

Tryon (H.). **Orange-piercing Moths (Fam. Ophiderinae).**—*Queensland Agric. Jl.*, xxi, no. 5, pp. 385–397, 5 pls. Brisbane, May 1924.

This paper, reprinted from this Journal of 1898, deals with the moths, *Othreis fullonica*, L., *Maenas salaminia*, Cram., and *Argadesa materna*, L. All three have a wide distribution, occurring in other countries besides Australia.

The food-plants are various species of Menispermaceae, including *Pericampylus incanus* and *Stephania* spp., the eggs being deposited on the foliage. The larvae are full-grown in about three weeks after hatching, and pupate in a cocoon in leaves spun together, the moths emerging about three weeks later. The adults damage *Citrus* and other fruits, such as mangos, bananas and grapes, by puncturing the skin and sucking out the juice, causing the fruit to fall.

Remedies recommended consist in destroying the food-plants of the larvae, removing all brushwood that may harbour the moths by day from the vicinity of orange orchards, and using bananas of the Cavendish type, which are particularly attractive, as baits. The moths may be poisoned by impregnating bananas with a syrup containing a small proportion of potassium arsenite, made by boiling equal weights of white arsenic and bicarbonate of potash in water. Sixty-four grains of each of the chemicals to 4 oz. water form convenient proportions.

Quarantine Proclamation no. 125.—*Commonwealth of Australia Gaz.*, no. 35. Melbourne, 5th June 1924.

This is a modification of the conditions of Quarantine Proclamation no. 112 [*R. A. E.*, A, xi, 474], against *Bacillus amylovorus*, as regards permits for special importation of ornamental plants and fruit trees.

RAMSAY (A. A.). **Fumigation with Liquid Hydrocyanic Acid. A Comparison of Costs.**—*Agric. Gaz. N.S.W.*, xxxv, no. 6, pp. 439–440. Sydney, 1st June 1924.

A table comparing the costs of fumigation against scale-insects on citrus trees shows that liquid hydrocyanic acid treatment ranges from $2\frac{3}{4}$ to 5 times that of generating the gas in the ordinary way.

GURNEY (W. B.). **Pink Boll-worm in Australia.**—*Agric. Gaz. N.S.W.*, xxxv, no. 6, p. 448. Sydney, 1st June 1924.

In view of the danger of introducing the pink boll-worm, *Platyedra gossypiella*, Saund., into New South Wales, it was urged at an interstate conference of entomologists that a regulation should be enforced to prevent the introduction from Western Australia, the Northern Territory or Queensland of any cotton, seeds, or parts of cotton plants into other States until adequate methods for destroying the pest have been established in the uninfested areas, and that a record should be kept of the exact districts from which seed is obtained and whither it is distributed.

ILLIDGE (R.). **Insect Notes.** *Parandra frenchi*, **Blkbn.**—*Queensland Nat.*, iv, no. 4, pp. 79–80. Brisbane, May 1924.

The Longicorn beetle, *Parandra frenchi*, Blkb., causes considerable destruction in Queensland to *Araucaria cunninghami*, when wounded, or felled for timber and left lying in the damp scrub. It is parasitised by a small black fly that deposits its eggs in both larvae and pupae.

CARNE (W. M.). **Pests and the Grower.**—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 2, pp. 148–149. Perth, June 1924.

A brief account is given of the insect pests either entirely absent or present in negligible numbers in Western Australia, though they may occur as serious pests in other parts of the country. The increase of these insects is largely prevented by the climate, an efficient inspection service, and the adoption of remedial measures at their first appearance. Co-operation is essential if the present freedom from them is to be maintained.

WICKENS (G. W.). **Co-operative Baiting for the Control of Fruit Fly.**—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 2, pp. 175–176. Perth, June 1924.

Co-operative baiting for the control of *Ceratitis capitata* was organised by fruit growers during 1922–23. In view of its success, the area to be treated was increased in 1923–24 to cover approximately 33 sq. miles, containing 132 separate orchards. At the end of the season it was found that about 14,700 trees had been treated at a total cost of under £68.

Provided that this baiting is carefully and systematically carried out and supplemented by the collection of all fallen fruit and the destruction of infested fruit, the losses due to fruit-fly may be reduced to negligible proportions.

NEWMAN (L. J.). **Winter Trapping of the Fruit-fly** (*Ceratitis capitata*, **Wied.**).—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 2, pp. 177–181, 11 figs. Perth, June 1924.

Ceratitis capitata, Wied., can successfully be trapped during the winter with the following bait: pollard 4 lb., molasses 4 oz., lead arsenate 5 oz., powdered borax 8 oz., and water to make 4 gals. The lead arsenate should be made into a thin paste and then all the ingredients should be thoroughly mixed and allowed to stand for 2 hours. The bait must be well agitated for use. The addition of the borax was found necessary to prevent the fermentation of the pollard. The mixture should be placed in 10 to 12 oz. lever-lid tins with a marginal edge. The addition of the molasses and lead arsenate is optional if this type of tin is used. It should be painted white inside and out and thoroughly cleaned before refilling. The traps are most effective from April to October and should be hung in the sun half way up the tree in proximity to the fruit. From October to April they should hang in the shade.

CLARK (J.). **Ants as a Domestic Pest.**—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 2, pp. 191–192. Perth, June 1924.

There are four species of *Monomorium*, *M. pharaonis*, *M. gracillima*, *M. ilia*, and *M. destructor*, in Western Australia, the latter being the most common. *M. ilia* is the only native species and is abundant in the bush, where it rapidly finds its way to the foodstores of camps.

The nests of these species should be treated with boiling water, kerosene, etc. A poison bait is also recommended, composed of 1 lb. sugar, ¼ lb. honey, 1 quart water, and ¼ lb. sodium arsenate.

NEWMAN (L. J.). **The Plague Locust** (*Chortoicetes terminifera*, **Walker**). —*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 2, pp. 199–208, 7 figs. Perth, June 1924.

With the growth of agriculture in recent years settlements in Western Australia have been pushed northwards and eastwards and have encroached upon the locust preserves. At the same time the clearing of timber and scrub has reduced the number of insectivorous birds, while ring-barking of large areas of timber has created an open, grassless country, which makes an ideal breeding ground for locusts. These conditions have been readily taken advantage of by the invading locusts, and instead of returning to their natural permanent breeding grounds, they have during recent years established themselves in the new, artificially produced ones. During the past 4 or 5 years these areas have given rise to swarms of locusts, and the crops in the vicinity have suffered serious losses. The area so far infested is limited. The species discussed (*Chortoicetes terminifera*, Wlk.) lays its eggs in almost any kind of soil so long as it is compact and not covered with dense grass. The progeny of eggs laid in October-November emerges in July to mid-August. In the agricultural areas so far infested by this

locust there is only one generation a year, but further north a second swarm, during March, has been observed. Young larvae begin to migrate in swarms after the first moult. The development of larvae takes about two months, and the adults live about six weeks, doing very serious damage to wheat. No long distance flights of swarms have been recorded.

Preventive measures include the avoidance of ring-barking unless the country can be brought under the plough immediately after its deforestation, and hard stubble paddocks should be broken up before July to destroy the eggs. The main need is an active co-operation amongst farmers. Recommendations for control, based on local experiments, include spraying with contact insecticides, such as soap, spraying and dusting with sodium arsenite, poisoned baits (bran 30 lb., Paris green 1 lb., molasses 5 lb., or sodium arsenite ½ lb., molasses 5 lb., water 4 gallons and sufficient bran to make a stiff dough), trenching and rolling.

EHRHORN (E. M.). **Report of Chief Plant Inspector, January-April 1924.**—*Hawaiian Forester & Agriculturist*, xxi, no. 2, pp. 69–80. Honolulu, April-June 1924.

The pests intercepted included: From China, *Monomorium pharaonis, Lepidosaphes gloveri,* and *Parlatoria* sp., on citrus fruits; *Chionaspis* sp. and *Lepidosaphes* sp. on pomelos; and *Rhopalosiphum* sp. on *Caladium.* From Japan, *Lepidosaphes beckii* on sour oranges; *L. ficus* on sandpears; *Hemichionaspis aspidistrae* on citrus fruit; various ants and other insects in a shipment of *Paulownia* logs; *Diaspis (Aulacaspis) pentagona*; and *Icerya* sp. From India, *Bruchus chinensis* in forage seeds. From the Philippines, *Lepidosaphes* sp., *Pseudaonidia trilobitiformis, Parlatoria zizyphus* and *Pseudococcus* sp. on pomelos; *Parlatoria pergandei* and *Pseudaonidia trilobitiformis* on citrus fruit; and *Bruchus chinensis* in beans. From California, an immature mealybug, probably *Pseudococcus gahani, Tetranychus* sp. and an Aphid on *Choisya*; *P. maritimus* on *Veronica,* canna roots, geraniums and dahlia bulbs; *P. gahani* on *Erica*; *P. citri* on *Coleus* and canna roots; *P. longispinus* on *Tecoma* and *Jasminum officinalis*; *Tetranychus* sp. on *Coprosma*; *Phenacoccus colemani* on *Hydrangea*; *Chionaspis pinifoliae* on spruce; and *Orthezia insignis* on *Coleus.*

SWEZEY (O. H.). **The Mexican Armyworm Parasite** (*Euplectrus platyhypenae*).—*Hawaiian Planters' Record,* xxviii, no. 3, pp. 318–320, 5 figs. Honolulu, July 1924.

Euplectrus platyhypenae, a Chalcid parasite of *Cirphis latiuscula,* has been imported from Mexico into Hawaii,where *C. unipuncta* is abundant. Under artificial conditions this parasite attacked any available species of armyworm or cutworm, *Spodoptera mauritia* being found the most suitable for rearing experiments.

The eggs are laid in clusters of from 5 to 30 on the surface of the host larva; the larvae hatch in 3 days and feed at the point of hatching on the body fluids of the host. The host does not die until the parasite is full-grown, which is in about 3 or 4 days. Pupation occurs in a fragile cocoon constructed beneath the caterpillar, by which the

caterpillar is attached to any object on which it may be resting. Pupation lasts from 6 to 9 days, so that there would be about 20 to 25 generations in the year.

Should this species become established under Hawaiian conditions, it should help considerably in controlling armyworms.

Lee (H. A.) & Jennings (W. C.). **Bacterial Red Stripe Disease of Tip Canes.**—*Hawaiian Planters' Record*, xxviii, no. 3, pp. 391–397, 3 pls. Honolulu, July 1924.

An account is given of the appearance, cause, dissemination and control of this disease. The peculiar odour or flavour of the infected tissues of the sugar-cane plant is apparently attractive to chewing insects, which may thus be responsible for a certain amount of the spread of the disease. Other means of dissemination are wind, rain and infected cuttings.

Bondar (G.). **A ferrugem na folha do algodoeiro.** [Cotton Leaf Rust.]—*Correio-Agricola*, ii, no. 6, pp. 172–174, 2 figs. Bahia, June 1924.

The Tingid bug, *Gargaphia bimaculata*, Parshley, is a pest of cotton in Brazil in the State of Bahia, producing a rusty discolouration of the leaves, on which all stages occur. An allied species, *G. torresi*, Costa Lima, is also a cotton pest [*R. A. E.*, A, x, 273]. A kerosene-soap emulsion has been tried with success against *G. bimaculata*. Immediately signs of attack appear, the affected plants should be cut down and burned or thrown in water. A small bug, *Xylocoris* sp., and a new thrips, which will be described shortly, prey upon *G. bimaculata*.

Bondar (G.). **As verrugas nas folhas da mandioca.** [Galls on the Leaves of Cassava.]—*Correio-Agricola*, ii, no. 6, pp. 174–175, 2 figs. Bahia, June 1924.

The larva of a Cecidomyiid, *Eudiplosis brasiliensis*, Rbs., forms galls on the leaves of cassava [*Manihot utilissima*] and aepim [*M. palmata*], in which the complete life-cycle from egg to adult occurs. As a rule little harm results, but if the galls are very numerous, infested leaves should be destroyed.

Azevedo (A.). **Uma nova praga dos cafeeiros.** [A new Pest of Coffee Plants.]—*Correio-Agricola*, ii, no. 6, pp. 180–181. Bahia, June 1924.

A new pest of coffee in the State of S. Paulo is a Scolytid of foreign origin. It is not yet certain whether this is a species already recorded from Brazil, such as *Xyleborus coffeae*, or a recent importation. *X. hagedorni* and *X. iheringi* are both known in S. Paulo, the former from *Acacia* and the latter from *Eucalyptus*. Spraying with lead arsenate, calcium arsenate or calcium cyanide, and the destruction of infested bushes are the measures advocated.

ALDRICH (J. M.). **A New Genus and Species of two-winged Flies of the Family Chloropidae injuring Manihot in Brazil.**—*Proc. U.S. Nat. Mus.*, lxv, Art. 21, no. 2534, pp. 1–2. Washington, D.C., 1924.

Teleocoma crassipes, gen. et sp. n., is described from Brazil as mining in cassava (*Manihot utilissima*).

SOMERVILLE (R. C.). **The Yam Borer Pest.**—*Jl. Jamaica Agric. Soc.*, xxviii, no. 6, pp. 202–203. Kingston, June 1924.

Yams in Jamaica have been seriously damaged by a borer in the tubers and heads, particularly of yellow yams. Immersing the infested heads in a strong solution of Jeyes' fluid and lime has proved beneficial. Drought is favourable to the insect, and a mulch is recommended, as the soil is thus rendered too damp for it.

Regulations under the Destructive Insect and Pest Act. General Regulations ; Regulation no. 1 (Foreign), 1st Revision ; no. 3 (Foreign), 1st Revision ; no. 10 (Foreign), 1st Revision ; no. 2 (Domestic), 3rd Revision.—*Canada Dept. Agric.*, 1 p. (typescript) ; 3 pp. ; 1 p. ; 2 pp. ; 2 pp. Ottawa, Ont., 8th April 1924.

Minor alterations to the Regulations under the Destructive Insect and Pest Act, 1923 [*R. A. E.*, A, xi, 475] are made under the above headings, to take effect as from 8th April 1924.

Work and Progress of the Agricultural Experiment Station for the Year ended December 31, 1922.—*Idaho Agric. Expt. Sta.*, Bull. 131, 71 pp. Moscow, Ida., January 1923. [Received 22nd July 1924.]

The alfalfa weevil [*Hypera variabilis*, Hbst.] does not appear to have spread to new areas in Idaho since 1921, but the infested localities have become more extensive and the amount of injury greater. The parasite, *Bathyplectes curculionis*, Thoms., has become established and appears to be materially assisting in the control of the weevil.

A detailed study of the biology of beetles of the genus *Eleodes*, injurious to grain crops, resulted in the discovery of 8 species, of which, however, only *Eleodes hispilabris*, Say, occurs in sufficient abundance to warrant control investigations. These have been undertaken on an extensive scale [*R. A. E.*, A, x, 310 ; xi, 227]. The eggs of this beetle are laid in greatest numbers in June, with an average incubation period of 1·35 days. The larvae cause serious damage to spring and autumn planted wheat by destroying the germ of the seed, by killing the developing shoot and by feeding on tender leaves below the surface of the ground. They feed right through the autumn and during the following spring. Field observations indicate that they remain in the soil for about a year before transforming to adults. There is apparently no difference in the injury whether the land is summer-fallowed or continuously cropped.

Many unusual insect outbreaks occurred during the year, including the western (mormon) cricket [*Anabrus simplex*, Hald.] ; the false chinch bug [*Nysius ericae*, Schill.], which was most injurious and generally distributed, attacking strawberries and potatoes ; the tarnished plant bug [*Lygus pratensis*, Fall.], responsible for similar widespread injury to potatoes ; the forest tent caterpillar [*Malacosoma disstria*, Hb.], particularly severe in northern Idaho, though the autumn

larvae and pupae were heavily parasitised ; the pine butterfly [*Neophasia menapia*, Fall.], causing heavy defoliation of yellow pine [*Pinus ponderosa*] ; spotted blister beetles [*Epicauta maculata*, Say], attacking sugar-beets and lucerne seed ; the carrot beetle [*Ligyrus gibbosus*, DeG.], which injured head lettuce ; and the zebra caterpillar [*Mamestra picta*, Harr.], which damaged cabbage, sugar-beet and head lettuce.

WAKELAND (C.). **Alfalfa Weevil and its Control in Idaho.**— *Idaho Agric. Expt. Sta.*, Circ. 34, 11 pp. Moscow, Ida., January 1924.

The various stages and the life-history of *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.), are described, and suggestions are made for its control [*R. A. E.*, A, ix, 461 ; xii, 317].

SMITH (R. H.). **The Clover Aphis ; Biology, Economic Relationships and Control.**— *Idaho Agric. Expt. Sta.*, Res. Bull. 3, 75 pp., 35 figs. Moscow, Ida., January 1923. [Received 22nd July 1924.]

The observations here recorded at great length were begun in 1918, at the end of which year a preliminary report was published [*R. A. E.*, A, viii, 279]. The literature concerning *Anuraphis bakeri*, Cowen, its distribution and economic importance, are discussed. The infestation of clover fields may arise from two sources, either as a result of migrant Aphids flying from fruit trees to clover in the spring, or through the individuals that remain through the winter in the crowns of the clover plant. The relative importance of the two sources of infestation varies in different years. As a result of experimental infestation of the clover fields, it is concluded that a single migrant may, in favourable circumstances, bring about the general infestation of a clover field within 60 days. Even though the numbers of *A. bakeri* occurring on quince, apple and pear trees during the spring may be comparatively small, it is probably sufficient to cause the general infestation of the clover fields over an area of many miles. The earlier in the season the infestations begin the sooner natural enemies may be expected to control the Aphids.

This species exhibits an alternation of food-plants in northern latitudes. Eggs are laid during the autumn and early winter on quince, apple, pear and hawthorn ; and also to a less extent on other trees. They are deposited about the buds and in crevices of the bark, on fruit spurs and branches. They hatch about the time the fruit buds begin to swell. Reproduction begins 18–25 days after the emergence of the stem-mothers, the earliest date observed being about 13th April. The height of the infestation on fruit trees is reached about the time the petals begin to fall from apple blossoms and when about one half of those of quince are opened. The winged forms, which migrate to clover, appear in large numbers in the third and succeeding generations.

Various species of clover are attacked, though red clover (*Trifolium pratense*) appears to be the most favoured. On clover the Aphids show a decided preference for the more secluded parts of the plant, and only appear on the exposed surfaces when overcrowded. In late autumn many individuals move deep into the crowns of the plants, where they may survive the winter. The autumn migrants consist of males and viviparous females, which develop on clover plants and fly to the winter food-plants (fruit trees). Migration generally begins about the last week in August and continues until the foliage has fallen from the trees,

Oviparae have occurred in relatively large numbers on quince and less numerously on pear and apple trees. Keys are given to the various stages of this species and of *Anuraphis roseus*, Baker, *A. helichrysi*, Kalt., *Aphis pomi*, DeG., *A. crataegifoliae*, Fitch, and *Rhopalosiphum prunifoliae*, Fitch.

The author has reached the conclusion that *Aphis senecio*, Swain [*R. A. E.*, A, vii, 387], which Davidson [*R. A. E.*, A, vi, 416] mistook for *Anuraphis bakeri*, is a synonym of *A. helichrysi*.

The relative importance of the natural enemies of *A. bakeri* is discussed. Fifteen different species of Coccinellids have been found on clover plants infested with *A. bakeri*, those of particular importance being *Hippodamia sinuata*, Muls., particularly important in Idaho; *H. lecontei*, Muls., *H. convergens*, Guér., *H. tredecimpunctata*, L., *Coccinella transversoguttata*, Fald., *C. novemnotata*, Hbst., *C. trifasciata*, L., *Adalia bipunctata*, L., *Scymnus brullei*, Muls., *S. nanus*, Lec., and *S. ardelio*, Horn. The particular importance of the genus *Scymnus* lies in the fact that the beetles remain in the clover fields throughout the winter and destroy many of the overwintering Aphids. Although Coccinellids are of great importance in destroying the later stages of *A. bakeri*, they are unable to attack the younger Aphids owing to the sheltered position of the latter.

Of the seven predacious bugs previously recorded, *Camptobrochis nebulosus*, Uhler, and *Anthocoris antevolens*, White, have been of special importance in attacking the stem-mothers and the early generations on fruit trees. The most important species occurring in clover fields have been *Triphleps tristicolor*, White, and *Geocoris bullatus*, Say. The early stages of the latter feed on the stems of clover. Other species are *Nabis ferus*, L., *Xylocoris cursitans*, Fall., and another undetermined species of the same genus.

There are also seven species of Dipterous larvae that prey upon the clover aphis: *Syrphus americanus*, Wied., *Leucopis griseola*, Fall., *Sphaerophoria sulphuripes*, Thom., *Eupeodes volucris*, O.S., *Paragus tibialis*, Fall., *Syritta pipiens*, L., and *Mesograpta marginata*, Say. Two undetermined Chrysopids have been found to be of importance in destroying the Aphids on fruit trees but were seldom seen in clover fields.

The Chalcid, *Aphelinus lapsiligni*, How., is by far the most important parasite, accounting for about 97 per cent. of the Aphids parasitised by Hymenoptera. Other parasites are *Aphidencyrtus aphidiphagus*, Ashm., *Polynema striaticorne*, Gir., *Praon coloradensis*, Ashm., and a species of *Megorismus*, though the last two are of practically no importance. The Cynipid, *Charips leguminosa*, Weld, has only been reared in the same cage with *Aphelinus lapisligni*, so that it is presumably a parasite of this species.

Experiments show that there is no practical way of destroying any large percentage of the Aphids in infested clover fields at or immediately preceding the vulnerable period in the development of the seed crop. In some circumstances the time of cutting the hay crop of red clover has a material influence in checking the development of infestation of the seed crop. The usual practice adopted in the irrigated sections of Idaho is to cut the red clover field in the early part of June for a crop of hay and allow the second growth to produce seed. General observations show that the hay crop should not be cut until after the Aphids have become abundant on the plants. The mere cutting down of the plants destroys a large number of the Aphids, allowing the remaining

ones to be more easily controlled by natural enemies. From the standpoint of seed production alone the hay crop should be cut between 1st and 20th June. Many farmers allow the first crop to seed ; though this practice produces a lower yield, it has the combined advantage of eliminating dodder from the seed and avoiding injury from clover aphis (the plants have passed the period of blossoming and filling before the Aphids become especially numerous). The advisability of leaving the first crop for seed must, however, vary in different years, depending chiefly upon the time the Aphids appear in the fields.

In addition to the other experiments [*R. A. E.*, A, viii, 279] brush-dragging after the red clover hay crop is cut has been tested, with similar results to those obtained in pasturing with sheep except that a smaller percentage of Aphids were killed and the plants did not suffer so severe a set-back. The Aphids were destroyed in sufficient numbers, however, to allow the remainder to be killed by natural enemies. Brush-dragging was done during the hottest part of the day ; when the temperature was 90° F. or more the heat absorbed by the soil was sufficient to kill the Aphids that fell into the dust or came in contact with it when it was drawn into the crown of the plants. Withholding irrigation water from the clover fields for a week or two before and after the hay is cut retards the development of the Aphids over a period of 10–14 days, enabling the natural enemies to control the infestation. Nicotine sulphate alone at the rate of ¾ pt. to 100 gals. of spray, or nicotine in combination with lime-sulphur, effectively controlled the Aphids on fruit trees, if applied just after green tips appeared on the blossom buds.

Patch (E. M.). **The Summer Food Plants of the Green Apple Aphid** (*Aphis pomi*).—*Maine Agric. Expt. Sta.*, Bull. 313 (1923), pp. 45–68, 8 figs. Orono, Me., 25th April 1924.

Although the entire life-cycle of *Aphis pomi*, DeG. (green apple aphis) has been traced through on apple alone, the author has discovered that early in the summer in Maine the winged forms that develop on the apple fly not only to fresh shoots of apple but also to a wide range of other vegetation, where they establish colonies that thrive during the summer. In Maine, there are numerous small Aphids abundant on weeds, garden plants and vegetables, which are obviously only summer residents on such plants, as stem-mothers are never found among them and they all depart before oviposition in the autumn. Microscopic examination has resulted in assigning these to three definite species, *A. pomi*, *A. gossypii*, Glov., and *A. abbreviata*, Patch, the differentiating characters of each being pointed out. It is hoped that a definition of these three species will render possible the determination of many others of the green and yellow Aphids so common in summer. The life-cycle of *A. pomi* on apple is quoted from a previous paper [*R. A. E.*, A, v, 8], and this is similar to the Maine cycle, although it involves a larger number of generations. A list of 49 food-plants on which *A. pomi* has been found feeding in Maine is given. Experimental work was undertaken to test the summer habits of *A. pomi* on apple and *Spiraea*, especially with a view to determining whether the Aphid on *Spiraea* (*A. spiraecola*, Patch) is, as the author suspected, identical with *A. pomi*. *A. pomi*, when placed on *Spiraea*, colonised that plant, the progeny developing normally, and the converse proved true of the green *Spiraea* Aphid on apple. Moreover, consistent characters have not

been found in the viviparous forms (either winged or wingless) to distinguish the two either in living material or in microscopic preparations. While these are not considered as conclusive proofs of the identity of the species, they, together with certain structural characters, which are discussed, and which seem to vary as much in different individuals of one species as in compared individuals belonging to the two species, lead the author to conclude that there is only one very variable species in question. It is probable that *Spiraea*, and not *Pyrus*, was the original food-plant of the species ; that the normal cycle is still followed with reference to *Spiraea*, while *Pyrus* has been found satisfactory enough to serve as a food-plant throughout the year ; and that the sexual generation of the species is dimorphic, the rather degenerate forms on the apple (with wingless male) being a modification in the "apple race" in the sexual generation. The species is unstable to a marked degree in colour, size and structure, these variations being discussed and shown in figures. The wide summer range of food-plants argues potential damage to summer vegetation not hitherto suspected ; as yet the summer colonies have not seemed very numerous on any important commercial vegetation, many of the food-plants being visited apparently for the course of one or two generations only. In view of its summer habits it may serve as a carrier of plant diseases ; the bearing of these habits on its economic relation with the apple cannot yet be fully stated.

Smith (C. E.). U.S. Bur. Ent. **The Sweet-potato Weevil in Louisiana and its Control.**—*Louisiana Agric. Expt. Sta.*, Bull. 188, 24 pp., 5 figs. Baton Rouge, La., August 1923. [Received 31st July 1924.]

The work in connection with the study of *Cylas formicarius*, F. (sweet potato weevil) in Louisiana was begun in April 1918 and continued till June 1920. An account is given of its general distribution, wild food-plants, dissemination, life-history and control as particularly applying to Louisiana conditions.

Cooley (R. A.), Parker (J. R.) & Regan (W. S.). **Spraying for Oyster-shell Scale.**—*Montana Agric. Expt. Sta.*, Circ. 124, 15 pp., 4 figs. Bozeman, Mta., March 1924.

Experiments carried out over many years in the control of *Lepidosaphes ulmi*, L. (oyster-shell scale) in Montana have led to the following recommendations :—Lime-sulphur (28° Bé.) 1 : 9, used as a dormant spray just before the leaf-buds open ; and 1 : 24 when the blossom buds show pink and again when the petals are falling, with the addition of 3 lb. lead arsenate per 100 U.S. gals. if codling moth [*Cydia pomonella*, L.] occurs. If the fruit-tree leaf-roller [*Tortrix argyrospila*, Wlk.] is present, Dormoil 1 : 11½ applied just as the eggs are hatching will protect the fruit and, if followed for several seasons, will exterminate *L. ulmi*, but is rather an expensive method. The applications should be made with a spray gun at high pressure (275 to 300 lb.).

Entomology.—*Ann. Rept. Iowa Agric. Expt. Sta., 1922–23*, pp. 43–44. Ames, Iowa. [1924.]

Diabrotica vittata, F., a serious pest of curcurbits, and *Aphis gossypii*, Glov., may be controlled by dusting; both insects may transmit wilt and mosaic disease. Infestation by *Mayetiola* (*Phytophaga*) *destructor*, Say, has been considerably reduced by the co-operation of farmers in sowing after the fly-free date.

Haseman (L.), Sullivan (K. C.) & McBride (O. C.). [**Entomological Investigations, 1922–23.**]—*Missouri Agric. Expt. Sta.*, Bull. 210, pp. 48–51, 4 tables. Columbia, Mo., February 1924.

Much of the information on the work of the year has already been noticed in this *Review*. Calcium cyanide proved effective in furrows [*R. A. E.*, A, xii, 317] against the chinch bug [*Blissus leucopterus*, Say], and also as a dust on growing maize at the rate of 15 lb. per acre. In heavy infestations two applications with an interval of three days gave effective control. Good results were also obtained by dragging a log in the furrow as well as with barriers of crude oil or creosote. Various dusts have been tried for the control of the striped cucumber beetle [*Diabrotica vittata*, F.], fair results being obtained with calcium cyanide and air-slaked lime in equal parts. No injury to plants was noticed. Naphthaline balls used at the rate of 1 to 3 per hill pressed lightly into the soil beneath the plants did not injure them, and in no case was any attack by *D. vittata* or any other insect noticed. Their effect lasted for about 6 weeks.

Conner (A. B.) & Reinhard (H. J.). **Cotton Boll Weevil Control in Texas.**—*Texas Agric. Expt. Sta.*, Circ. 32, 14 pp. College Station, Tex., May 1924.

The life-history of the cotton boll-weevil [*Anthonomus grandis*, Boh.] and the history of its effect upon cotton production in Texas is discussed. The question of control, which resolves itself into one of good farming, is also dealt with. Every effort should be made to destroy the cotton plants in the autumn as soon as the crop is harvested and to provide the best conditions for fruiting, thus ensuring profitable yields even under boll-weevil conditions. In individual cases spraying with calcium or lead arsenate may prove necessary [*cf. R. A. E.*, A, viii, 457, etc.].

Britton (W. E.). **Twenty-third Report of the State Entomologist of Connecticut, 1923.**—*Connecticut Agric. Expt. Sta.*, Bull. 256, pp. 223–316, 16 pls., 8 figs. New Haven, Conn., 1924.

Insects injuring fruit during 1923 were *Psylla pyricola*, Forst. (pear psylla); *Aspidiotus perniciosus*, Comst. (San José scale), which is slightly increasing; *Lygidea mendax*, Reut. (false apple red bug), which was less in evidence than usual; *Eriophyes pyri*, Pagst. (pear-leaf blister-mite); *Paratetranychus pilosus*, C. & F. (European red mite), in apple orchards; *Anuraphis roseus*, Baker (rosy apple aphis), which was less injurious than usual though eggs were abundant on the fruit spurs; *Aphis pomi*, DeG. (green apple aphis); *Empoa rosae*, L.

(rose leafhopper), *Macrodactylus subspinosus*, F. (rose chafer), and *Lygus pratensis*, L. (tarnished plant bug), all injuring apple, and the last-named also damaging peach nursery stock ; *Malacosoma americana*, F. (tent caterpillar), on apple and wild cherry ; *Rhagoletis pomonella*, Walsh (apple maggot), which was as abundant as usual, though apples sprayed or dusted with lead arsenate after 1st July were almost free from injury ; *Conotrachelus nenuphar*, Hbst. (plum curculio), chiefly injurious to apples ; *Cydia* (*Laspeyresia*) *molesta*, Busck (oriental peach moth), of which the larvae tunnelled in the twigs of peach trees and in the fruit late in the season (an account is given of this pest as occurring in other States, with the remedies for it) ; *Thyridopteryx ephemeraeformis*, Haw., which was taken once on quince ; *Lasioptera vitis*, O.S. (grape-vine tomato gall) ; and *Schizura concinna*, S. & A. (red-humped caterpillar).

Pests of vegetables, etc., included *Hylemyia cilicrura*, Rond. (seed corn maggot), which seriously damaged maize ; *Papaipema nitela*, Guen. (stalk borer), which was more troublesome than usual, attacking tobacco, tomato and pepper ; *Heliothis* (*Chloridea*) *obsoleta*, F. (corn earworm) ; *Aphis pseudobrassicae*, Davis (turnip aphis), on turnip and kale ; *Brevicoryne brassicae*, L. (cabbage aphis) ; *Acyrthosiphon* (*Illinoia*) *pisi*, Kalt. (pea aphis) ; *Macrosiphum solanifolii*, Ashm. (potato aphis) ; *Mellitia satyriniformis*, Hb. (squash vine borer) ; *Anasa tristis*, DeG. (squash bug) ; *Diabrotica vittata*, F. (striped cucumber beetle) ; *Epitrix cucumeris*, Harr. (potato or cucumber flea-beetle) ; *Melanoplus femur-rubrum*, DeG. (red-legged grasshopper), which damaged about 50 per cent. of tobacco leaves ; *Eucolaspis* (*Colaspis*) *brunnea*, F., feeding on bean leaves ; and *Pyrausta nubilalis*, Hb. (European corn borer).

Shade-tree and forest insects included *Phenacoccus acericola*, King (woolly maple-leaf scale), infesting sugar maples ; *Lepidosaphes ulmi*, L. (oyster-shell scale) ; *Argyresthia thuiella*, Pack. (arbor-vitae leaf-miner) ; *Pissodes strobi*, Pk. (white pine weevil) ; *Diprion simile*, Hart. (imported pine sawfly) ; *Galerucella luteola*, Mull. (elm leaf beetle) ; *Plagiodera versicolor*, Laich. (imported poplar and willow beetle), which is spreading eastward ; *Tortrix quercifoliana*, Fitch (oak leaf-roller) ; *Recurvaria piceaella*, Kearf. (spruce leaf-miner) ; *Chermes strobilobius*, Kalt. (larch leaf Aphid) ; *Chionaspis pinifoliae*, Fitch (pine leaf scale) ; *Phyllaphis fagi*, L. (beech leaf aphis) ; swarms of *Euceraphis deducta*, Baker, and *Aphis betulaecolens*, Fitch, on birches ; *Melanoxantherium* sp., very abundant on willows ; *Paraprociphilus* (*Prociphilus*) *tessellatus*, Fitch, on maple ; *Datana integerrima*, G. & R. (walnut caterpillar) ; *Evetria buoliana*, Schiff. (European pine-shoot moth), destroying the buds, generally of red pine [*Pinus resinosa*] ; *Bucculatrix canadensisella*, Chamb. (birch leaf skeletoniser), for which lead arsenate sprays in late July or early August are recommended ; *Alsophila pometaria*, Harr. (fall canker-worm), which was so abundant on shade, forest and apple trees that spraying with arsenicals is recommended to prevent heavy damage next season ; and *Hyphantria cunea*, Drury (fall webworm), on woodland and fruit trees.

Miscellaneous insects included *Gryllus domesticus*, L. (European cricket) ; *Attagenus piceus*, Oliv. (black carpet beetle) ; *Diarthronomyia hypogaea*, Loew (chrysanthemum gall-midge) ; *Nodonota puncticollis*, Say, a Chrysomelid beetle eating rose buds ; *Chionaspis euonymi*, Comst., recorded on *Pachysandra terminalis* ; *Poecilocapsus lineatus*, F. (four-lined leaf-bug), on currant and other plants ; and *Aegeria* (*Sesia*)

rhododendri, Beut. (rhododendron borer). Against *Monarthropalpus buxi*, Lab. (box leaf-miner), the foliage should be sprayed thoroughly about 1st May with miscible oil 1 : 20 parts water, with 1 pint 40 per cent. nicotine sulphate to each 50 gals. of mixture ; this treatment should be repeated about a week later. In Maryland 1 part molasses to 3 parts water sprayed on the foliage as the adults emerge has proved successful.

In nurseries, the spruce gall Aphid, *Chermes abietis*, L., is one of the commonest pests ; it attacks various spruces, making a cone-shaped swelling at the base of the new growth, while *C. cooleyi*, Gill., causes larger galls on Colorado blue spruce [*Picea pungens*]. The young females of these Aphids live on the twigs through the winter and mature in the spring, oviposit and die. In May, the young crawl to the tips of the twigs and form the galls. In August, when mature, the nymphs escape from the galls, become winged, and crawl over the leaves, laying eggs which hatch in about 2 weeks, this generation being the one that hibernates on the twigs in a partly developed state. On small nursery trees, the galls should be clipped off in June and burnt. In April, and again in autumn, a spray of 1 part miscible oil to 20 of water has proved very successful, or 1 lb. fish-oil soap in 2 U.S. gals. of water is recommended for April treatment. Against *Lepidosaphes ulmi*, thorough spraying about the first week of June (just after the eggs hatch) with kerosene soap emulsion or nicotine solution and soap is advised, and it is well to cut and burn all badly infested branches. The apple and thorn skeletoniser, *Hemerophila pariana*, Clerck, which was reported as abundant in 1922 [*R. A. E.*, A, xi, 553], has now spread over the entire State. Swarms of a Geometrid, *Cingilia catenaria*, Drury, were troublesome in New Haven ; the larvae feed on bayberry and sweet fern and pupate in a loose net fastened to the leaves. *Alabama argillacea*, Hb. (cotton moth) also occurred in swarms. The adults migrate northward and are sometimes reported from the northern States and Canada in September and October ; they are not known to hibernate in the United States, unless possibly in Texas. A Japanese weevil, *Pseudocneorrhinus setosus*, Roel., has been found feeding on the leaves of burr marigold (*Bidens* sp.) ; the immature stages are not known. *Coleophora laricella*, Hb. (larch leaf-miner) was more abundant than for many years, turning the foliage of entire branches brown. Eggs are laid on the leaves during early June, and the larvae tunnel in them until September, when they make their winter cases, which they fasten to the branches and twigs and in which they remain through the winter, feeding for 3 or 4 weeks after the cases are made. With the warm weather, usually in April, the larvae migrate with their cases to the buds, fixing them to the newly opened leaves on which they feed, this period being the one when the most injury is done. In May the larvae pupate, attaching themselves at the base of short side branches and in the centre of leaf whorls. After 14 to 20 days the adults emerge (late May or early June). There is only one generation a year. There is no known method of controlling this pest in forests or large plantations, but on shade and ornamental trees, spraying with home-made concentrated lime-sulphur 29° Bé., 1 : 7, just before the buds begin to swell is advised ; this is the same treatment as for Coccids. Grass in lawns has been badly injured in a few places by the larvae of *Anomala orientalis*, Waterh. The distribution of this beetle, which has evidently been introduced with nursery plants from Japan, is not known. Unfortunately, its introduced parasite, *Scolia*

manilae, Ashm., cannot survive the winter in New Jersey, but it is hoped that some native species of *Scolia* or *Tiphia* may attack it. *A. marginata*, F., a species occurring in the southern Atlantic States but not previously recorded in Connecticut, also damaged lawns.

Careful scouting for *Pyrausta nubilalis*, Hb. (European corn borer) has revealed slight infestations, especially along the shore region of Connecticut, and the State quarantine against it was extended, a Quarantine Order (no. 5) becoming effective on 1st June 1923, and protecting the State against introduction of the pest from any of the infested areas in the United States, which are listed.

Inspection work in nurseries and apiaries is reported upon, *Aporia crataegi*, L., from France and *Emphytus cinctus*, L., from England, France and Holland, being intercepted on nursery stock.

ASHWORTH (J. T.) & BRITTON (W. E.). **Report of Gipsy Moth Work, Year ending June 30, 1923.**—*Connecticut Agric. Expt. Sta.*, Bull. 256, pp. 253–267, 1 fig. New Haven, Conn., 1924.

The present distribution of the gipsy moth [*Porthetria dispar*, L.] in Connecticut and the quarantined area are shown in a map; the situation in various counties is reported upon, and an account is given of the spraying operations. During 1921–23, 3,300,425 individuals of the Japanese egg parasite, *Schedius kuvanae*, How., were liberated in Connecticut.

ZAPPE (M. P.) & STODDARD (E. M.). **Experiments in Dusting versus Spraying in Connecticut Apple Orchards in 1923.**—*Connecticut Agric. Expt. Sta.*, Bull. 256, pp. 267–274, 1 fig. New Haven, Conn., 1924.

Spraying tests in 1923 have confirmed the results of previous years [*R. A. E.*, A, xi, 381, etc.]. Liquid sprays proved superior to sulphur dusts, both against insects, and, more particularly, against fungous diseases. In orchards that are on elevated slopes with good air drainage and not seriously affected by fungi, or where water is difficult to obtain, dust can, however, be used with a fair measure of success. Sulphur and lead arsenate dust was more successful than copper sulphate and arsenic dust, particularly against fungi.

GARMAN (P.). **Tests of Sodium Hypochlorite for Control of American Foul Brood of Bees.**—*Connecticut Agric. Expt. Sta.*, Bull. 256, pp. 275–276. New Haven, Conn., 1924.

Experiments are described in which sodium hypochlorite solution was used in an attempt to control American foul-brood of bees. While no very definite results were obtained, the risk of attempting control in combs where the disease is present seems too great, but the sterilisation of super combs and hive equipment is advocated. This must be done with the greatest thoroughness to ensure success, it being almost impossible to reach all parts of a comb with sufficient solution to kill the organism.

ZAPPE (M. P.). **Further Experiences with Paradichlorobenzene as a Remedy for Peach Borers.**—*Connecticut Agric. Expt. Sta.*, Bull. 256, pp. 276–277. New Haven, Conn., 1924.

Experiments in 1923 with paradichlorobenzene against *Aegeria* (*Synanthedon*) *exitiosa*, Say (peach borer) have confirmed previous findings [*R. A. E.*, A, xi, 556, etc.]. All borers below the surface of the soil were killed by the treatment.

CUTRIGHT (C. R.). **Bionomics of *Hippodamia tredecimpunctata* L.**—*Ann. Ent. Soc. Amer.*, xvii, no. 2, pp. 188–192. Columbus, Ohio, June 1924.

Hippodamia tredecimpunctata was found most commonly on crucifers, feeding on *Myzus persicae*, *Brevicoryne brassicae*, and *Aphis* (*Rhopalosiphum*) *pseudobrassicae*; also on aquatic plants, where it feeds on *R.* (*Myzus*) *nymphaeae*.

The Braconid, *Dinocampus americanus*, only rarely parasitised the adults. The larvae are attacked by the Chalcids, *Homalotylus flaminius*, *Pachyneuron aphidiorum*, and another species of *Pachyneuron*. Eggs and pupae were not parasitised, but these stages may be attacked by the adults and larvae of all Coccinellids when there is a lack of food.

HAMLIN (J. C.). **A Review of the Genus *Chelinidea* (Hemiptera-Heteroptera) with Biological Data.**—*Ann. Ent. Soc. Amer.*, xvii, no. 2, pp. 192–208. Columbus, Ohio, June 1924.

The cactus bugs of the genus *Chelinidea* are among the more important insect enemies of prickly pear. This treatment of the genus is based on studies made by the author in the United States of America and Mexico and includes a key to the species with notes on the life-history, distribution, food-plants and natural enemies.

HERRICK (G. W.). **The Genus *Limothrips* (Thysanoptera) in America.**—*Ann. Ent. Soc. Amer.*, xvii, no. 2, pp. 231–232, 3 figs. Columbus, Ohio, June 1924.

Up to the present two species of this genus have been recorded from North America, *Limothrips angulicornis*, Jabl. (*setariae*, Jones), from California on a fox-tail grass [*Setaria viridis*], etc., and *L. cerealium*, Hal. (*avenae*, Hinds), from Massachusetts and Pennsylvania on oats and *Festuca pratensis*. A third species, *L. denticornis*, Hal., is now recorded from Ithaca, N.Y., on wheat and in the nests of robins and sparrows. A key to these species is given.

FOUTS (R. M.). **Revision of the North American Wasps of the Subfamily Platygasterinae.**—*Proc. U. S. Nat. Mus.*, lxiii, Art. 15a, no. 2484, pp. 1–145, 1 pl. Washington, D.C., 1924.

This revision of the Platygasterine Proctotrupids of North America includes keys to the genera and to the species of many genera, with descriptions of some 26 new species. A list of the various insect hosts referred to is given, and includes a number of Cecidomyiids and a few Coccids.

Beeson (C. F. C.). **What is the Lac Insect?**—*Indian Forester*, 1, no. 7, pp. 345–350. Allahabad, July 1924.

The problem of the insect or insects that produce the lac used in commerce is one that has only been studied within the past few years; in this paper the more notable contributions to the subject are briefly reviewed. The different products resulting from the true lac insects and the pseudo-lac insects are defined, and a table is given of the species of lac insects found in India, which correlates the opinions of various authors as to the specific and generic limits of the forms. It is pointed out that the six names proposed by Mahdihassan [*R. A. E.*, A, xii, 6], for inclusion among the eight forms of true lac-producing insects are not accompanied by any recognisable morphological description, and cannot therefore be accepted. From the economic aspect, the lac cultivator is not assisted greatly by any solution of the problem whether *Tachardia lacca* is a single species or a group of morphologically similar species, though the majority of people incline to the former view.

Kunhi Kannan (K.) [**Report of the Entomologist.**]—*Admin. Rept. Agric. Dept., Mysore 1922–23*, pt. i, pp. 4–5, pt. ii, pp. 16–20. [Bangalore] 1924.

Work on *Amsacta albistriga* was successfully continued, large numbers of moths being destroyed, but hand-picking the caterpillars is found most effective.

Experiments to find a simpler remedy than spraying against mango hoppers (*Idiocerus* spp.) have not been successful, but it is suggested that sacrificing the crop in years when the blossoming is poor might prevent the hoppers from being carried over from one year to the next.

In treating manure pits with lead arsenate as a control for *Oryctes rhinoceros* it was found that larvae do not necessarily eat through the soil to pupate, and the manure itself must, therefore, be poisoned a few inches above the floor level.

The belief that metallic mercury has insecticidal properties has been confirmed, Bruchid eggs being killed when exposed to mercury vapour for one hour.

Last year's method of controlling the sugar-cane moth borers has been equally successful this year, infestation at harvest time being only 6 per cent. [*cf. R. A. E.*, A, xi, 291]. Elephant grass in the marshy lands, however, and the cold weather crop of jola [*Sorghum*] were badly infested. The trash heaps not only attract the borer moths but other insects also, among which is a beetle predacious on the moths.

Two other Lepidopterous pests reported are a caterpillar infesting cardamoms and *Hypsa ficus*, which destroys the young shoots of *Ficus*.

Hector (G. P.). **Reports of the Economic Botanist to the Government of Bengal for the Years 1919–1923.**—*Repts. Dept. Agric. Bengal*, 1919–20, appdx. v, p. iii; 1920–21, pp. 33–36; 1921–22, pp. 37–41; 1922–23, pp. i–v. Calcutta, 1921–1924.

Cryptorrhynchus gravis (mango weevil) was generally an important pest; bagging the fruit to prevent oviposition was practised with success, as well as plucking young fruits with eggs on them. It is

thought that the weevils probably shelter in the ground during the cold months, and when the mango crop failed, after the cyclone of 1919, many of the weevils were starved out, infestation being very slight during 1921–22. A serious attack of *Agrotis ypsilon* (greasy cutworm) occurred on ganja [*Cannabis sativa*] in 1922. Poison bait proved useless, and cultivators were urged to handpick the caterpillars and irrigate the crop, which was thoroughly done. *Brachytrypes portentosus* (*achatinus*) (large brown cricket) was troublesome, particularly on young jute plants; it was kept in check by pouring kerosene and water into the burrows. *Eriophyes* sp. (litchi mite) was treated by destroying the infested leaves periodically. The remedy for *Rhynchocoris humeralis* (green orange bug) and *Cappoea taprobanensis* (speckled orange bug) was collection and destruction of the eggs (when not parasitised) and of the nymphs and adults. *Monochamus* (*Monohammus*) *versteegi* (orange tree borer), *Arbela tetraonis* (litchi bark borer) and *Rhytidodera simulans* (mango tree borer) were destroyed by injecting turpentine oil into the bore-holes, but this is not practicable with very big trees. Collection and destruction of the emerging beetles of *M. versteegi* is also recommended. Against termites in sugarcane seed-beds, dipping the cut ends of setts in coal-tar before planting was found to be a preventive.

Other pests included *Anomis* (*Cosmophila*) *sabulifera* (jute semilooper); *Diacrisia obliqua* (jute hairy caterpillar); *Pachydiplosis oryzae* (rice gall-fly); *Hispa aenescens* (rice Hispid); *Nephotettix bipunctatus* (small rice Jassid); *Earias fabia* (spotted bollworm of cotton); *Sylepta derogata* (cotton leaf-roller); *Dysdercus cingulatus* (red cotton bug); *Utetheisa pulchella* (sunn caterpillar); *Laphygma* (*Caradrina*) *exigua* (indigo caterpillar); *Brevicoryne* (*Aphis*) *brassicae* (mustard aphis); *Cirphis* (*Leucania*) *unipuncta* (rice army-worm); *Schoenobius incertellus* (*bipunctifer*) (rice stem-borer); *Athalia proxima* (mustard sawfly); *Alcides frenatus* (mango shoot-borer); *Phyllocnistis citrella* (pomelo leaf-miner); *Nymphula depunctalis* (rice case-worm); *Antigastra catalaunalis*, a leaf-roller of til [*Sesamum*]; and *Argina cribraria* (orange sunn moth). An insect found eating the leaves of *Eugenia jambolana* proved to be a hitherto undetermined species of *Antispila*.

JARDINE (N. K.). **Plantain Root Beetle Borer.**—*Dept. Agric. Ceylon*, Leaflet 29, 1 p., 1 pl. [Peradeniya] 6th February 1924.

A brief account is given of the life-history of the black banana weevil [*Cosmopolites sordidus*, Germ.], with descriptions of the various stages and recommendations for its control [*cf. R. A. E.*, A, xii, 268].

HUTSON (J. C.) & AUSTIN (G. D.). **Notes on the Habits and Life-history of the Indian Glow-worm (an Enemy of the African or Kalutara Snail).**—*Dept. Agric. Ceylon*, Bull. 69, 16 pp., 1 pl. Peradeniya, May 1924.

The bulk of this information concerning the Lampyrid, *Lamprophorus tenebrosus* (Indian glow-worm), predacious on *Achatina fulica* in Ceylon has already been noticed from another source [*R. A. E.*, A, xii, 269].

GHOSH (C. C.). **The Palm Beetles in Burma with Notes on other Palm Pests.**—*Dept. Agric. Burma*, Bull. 19, 38 pp., 9 pls. Rangoon, 1923.

GHOSH (C. C.). **The Important Insect Pests of the Coconut in Burma and how to check them.**—*Dept. Agric. Burma*, Leaflet 14 (Old Ser. 17), 11 pp., 9 pls. Rangoon, 1924.

Details are given of the more important palm pests and their control in Burma, a brief account of which has already been noticed [*R. A. E.*, A, xii, 382]. In connection with *Oryctes rhinoceros*, L., the various stages are described, and its occurrence, as well as some of the legislation against it, in other countries, is reviewed. The same information is given in a shorter form in the Leaflet.

VAN DER GOOT (P.). **Levensduur en opbrengst van sawah-padi in verband met ouderdom der bibit, planttijd, e.a. factoren.** [Time of Development and Yield of Paddy in Relation to the Age of Seedlings, Season of Transplanting, and other Circumstances.]—*Meded. Inst. Plantenziekten*, no. 60, 39 pp., 30 tables, 16 graphs. Buitenzorg, 1923. (With a Summary in English.)

These investigations were undertaken because injury by the white rice-borer, *Scirpophaga sericea*, Sn. (*innotata*, Wlk.), to rice in Java may be largely avoided if care be taken that the period of shooting in the ears does not coincide with that of a flight of the moths, of which there are several generations a year. The practical application of the results is dealt with in a monograph already noticed [*R. A. E.*, A, xi, 572].

PALM (B. T.) & FULMEK (L.). **Ziekten en plagen van** *Mimosa invisa*, [Diseases and Pests of *M. invisa*.]—*Meded. Deli Proefst.*, 2nd Ser., no. 35, pp. 27–36. Medan, 1924.

As *Mimosa invisa* is grown among tobacco in Deli, Sumatra, it was thought desirable to ascertain the insects that occur on it and might become pests of tobacco.

The Nematode, *Heterodera radicicola*, occasionally infests *M. invisa*, but it is not likely to be of importance to tobacco. Locusts, especially *Valanga* (*Cyrtacanthacris*) *nigricornis*, infest *M. invisa*, particularly on dry, sandy soils. Two caterpillars found on this plant are *Heliothis obsoleta* and *Euproctis scintillans*, but the latter is seldom of economic importance. *H. obsoleta* only represents about 2 per cent. of this genus on tobacco, the remaining 98 per cent. being *H.* (*Chloridea*) *assulta*, which is the species injurious to tobacco in Deli, and which does not usually occur on *M. invisa*. Other caterpillars include *Prodenia litura*, which prefers tobacco; *Phytometra signata*, which usually rejects *Mimosa*; *Pachyzancla ambitalis*, only once bred on *Mimosa*; and *Phthorimaea* (*Gnorimoschema*) *heliopa*, which usually does not develop on *Mimosa*. Except perhaps as regards *H. obsoleta*, *M. invisa* is therefore not a source of danger in connection with Lepidopterous pests of tobacco. *Halticus minutus* is unimportant as a pest of tobacco, and another Capsid, *Dicyphus nocivus*, does not migrate from tobacco to *M. invisa*. Other bugs, such as *Leptocorisa* sp. and *Riptortus* sp., that occur on *M. invisa* are unimportant as

regards tobacco. A scale, *Pseudococcus* sp., is found on *Mimosa*, while *Pseudococcus citri*, possibly the same species, occurs on tobacco, but is not likely to do much harm.

King (H. H.). **Entomological Section.**—*Sudan Govt. Sci. Res. Comm. Rept. 1923*, pp. 9–10. Khartoum [1924].

The most important cotton pest in Berber Province is *Platyedra gossypiella* (pink bollworm). In the investigations of the past few years distinct progress has been made, confirming the belief that seed cotton and seed stored by cultivators in their houses form the main sources of infestation ; every effort is being made to eliminate these. Cultural measures appear to be the best means of dealing with *Heliothrips indicus*. *Sphenoptera neglecta* (cotton stem borer) and *Oxycarenus hyalinipennis* (cotton seed bug) are responsible for a certain amount of damage, and a study of their bionomics is being undertaken. The probable value of sodium arsenite is indicated by experiments, as yet incomplete, in connection with the protection of timber for an indefinite period from the attack of termites.

Hall (W. J.). **The Insect Pests of Citrus Trees in Egypt.**—*Minist. Agric. Egypt*, Tech. & Sci. Service, Bull. 45, 30 pp. Cairo, 1924.

There are 12 scale-insects that attack *Citrus* in Egypt. These are, in order of their importance, *Chrysomphalus aonidum*, L. (black scale), *C. aurantii*, Mask. (red scale), *Lepidosaphes beckii*, Newm. (citrus mussel scale), *Icerya purchasi*, Mask. (Australian fluted scale), *Ceroplastes floridensis*, Comst. (Florida wax scale), *Pseudococcus citri*, Risso (common mealy-bug), *Phenacoccus hirsutus*, Green (hibiscus mealy-bug), *Pseudococcus perniciosus*, Newst. (lebbekh mealy-bug), *Aspidiotus lataniae*, Sign. (quince scale), *Coccus* (*Lecanium*) *hesperidum*, L. (soft scale), *Icerya aegyptiaca*, Dougl. (Egyptian mealy-bug), and *Ceroplastes rusci*, L. (fig wax scale). Brief notes are given on the general distribution of these species, their food-plants and the injury caused by them to *Citrus*. Similar notes are also given on other Coccids occurring in Egypt, but not recorded as pests of *Citrus*, though they attack this crop in other countries.

The insect pests attacking *Citrus* in Egypt other than the Coccids are not of very great importance ; they are *Ceratitis capitata*, Wied. (Mediterranean fruit-fly), *Aphis gossypii*, Glover (cotton aphis), *A. leguminosae*, Theo., and *Aleurodes* sp. *Drosophila melanogaster*, Mg., the Nitidulid, *Carpophilus hemipterus*, L., and the Pyralid, *Ephestia cautella*, Wlk., only attack fallen or damaged fruit.

The value of pruning for the control of scale-insects is pointed out, and the fumigation work carried on in Egypt is reviewed. Fumigation is practically the only measure employed, as *Chrysomphalus aonidum* is the only really serious pest in the big citrus-growing areas. Where fumigation is impracticable, spraying with paraffin emulsion is recommended, its preparation being described.

A list is given of the other insect pests likely to be introduced into Egypt, and the precautions taken at the ports of entry are discussed, as well as internal quarantine arrangements.

CHORLEY (J. K.). **Locusts. Life History and Methods of Suppression.** —*Rhodesia Agric. Jl.*, xxi, no. 3, pp. 299–306; also as [*Rhodesia Min. Agric. & Lands*] Bull. 503, 8 pp. Salisbury, June 1924.

The life-history of *Locustana pardalina*, Wlk. (brown locust) is compiled from a paper by J. C. Faure [*R. A. E.*, A, xi, 507]. The points to be remembered under the terms of the Locust Destruction Ordinance, 1918, which are similar to those of the Bechuanaland Proclamation [*R. A. E.*, A, xii, 112], are quoted, and instructions are given for the preparation and application of remedial measures. The latter include sodium arsenite sprays against the various stages, baits, screens, traps and smudge fires.

LITTLE (A.). **Locusts and Locust Meal as Poultry Food.**—*Rhodesia Agric. Jl.*, xxi, no. 3, p. 334. Salisbury, June 1924.

Locusts may be used as poultry food in their natural state or as meal, the preparation of which is described. A comparison between locust meal and other meals and fresh and separated milk shows that it has a high food value.

CHORLEY (J. K.). **Some Notes on the Regulations affecting the Importation and Exportation of Cotton.**—*Rhodesia Agric. Jl.*, xxi, no. 3, pp. 308–310; also as *Rhodesia Min. Agric. & Lands*, Bull. 505, 4 pp. Salisbury, June 1924.

There is grave danger of the introduction of the pink bollworm, *Platyedra* (*Pectinophora*) *gossypiella*, Saund., into Rhodesia, unless it can be kept out by restrictive legislation and inspection. The importation of cotton seed, seed cotton and ginned cotton from outside British South Africa is prohibited, and waste cotton used in packing other merchandise is examined at the ports of entry. Cotton seed and seed cotton may be imported from within British South Africa subject to a permit. The importation of cotton seed for crushing, seed cotton and cotton lint from Rhodesia into the Union of South Africa is permitted under certain conditions.

SAUNION (E. L.). **Notice sur les Acridiens migrateurs au Sénégal pour servir à leur étude et des moyens propres à les combattre.**—*Bull. Comité Études hist. & scientif. Afr. occid. Fr.*, viii, no. 2, pp. 189–219. Paris, April-June 1924.

A general outline is given of the life-history and control of locusts, two species, the Moroccan locust [*Dociostaurus maroccanus*] and a migratory locust [probably *Schistocerca gregaria*], being considered the most important in Senegal. Observations on the breeding-places in Senegal show that the Moroccan locust prefers stony ground near sand-hills for oviposition, while the other species always oviposits on slopes or at the bottom of valleys. A brief history of locust invasions since 1893 is given. The usual methods of control are described. It is strongly urged that the Entomological Service, which was established in 1914 at Saint Louis and closed down during the war, should be re-organised in order to undertake a thorough study of locusts and other pests in Senegal.

Organisation internationale de la lutte contre les Sauterelles. Report of the Inspecteur de la Défense des Cultures à Alger to the President of the International Institute of Agriculture.—*Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 2, pp. 463–464. Rome, April-June 1924.

In addition to the information received from French West Africa [*R. A. E.*, A, xii, 130] valuable data relating to the migratory locust [*Schistocerca gregaria*, Forsk.] were received in 1923 from stations in the Sahara close to the frontier of Tripoli. The invasion there was the most serious for 10 years, and a possible spread in 1924 northwards to Algeria was feared, but it is probable that the migration flight has been directed eastwards.

Jablonowski (J.). **Injuries caused by Locusts in Hungary during the Years 1913-1923.**— *Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 2, pp. 464–470. Rome, April-June 1924.

This report continues the information included in a monograph published in 1916 [*R. A. E.*, A, v, 100].

During 1913–1921 no noticeable injury was done by locusts in Hungary. In 1922 not only did *Dociostaurus maroccanus*, Thunb., appear over large areas on the Hungarian plain, but *Calliptamus italicus*, L., which is extremely injurious, also arrived and was still migrating in August, being in larger numbers than ever before noticed in Hungary. In 1923 both species again occurred, and a Tettigoniid, *Orphania denticauda*, Charp., was also numerous, but it did no injury to vegetation and disappeared in about a week. Measures against *D. maroccanus*, which, as usual, attacked cereals but did little harm in general, were abandoned owing to the urgent need for work against *C. italicus*. In 1923 the latter not only attacked lucerne, but many other crops, though vines escaped. In 1922 *C. italicus* had been attacked by *Empusa grylli* in the regions where it had appeared in previous years. Probably this accounts for the outbreak not lasting throughout nearly the whole of 1923, in which year *E. grylli* appeared on 1st July, a date when more than half the individuals of *C. italicus* were winged, though unable to fly far.

In August 1923 *Locusta migratoria* ph. *danica*, L., appeared, but only in small numbers. The areas infested were ploughed in the autumn.

Satisfactory results against *D. maroccanus* were obtained in 1923, except where the appearance of large bands of *C. italicus* and the very advanced season (harvest time) made proper measures impossible. On the other hand, very poor results were attained against *C. italicus* owing to the large zones involved, the different methods adopted, and the entire lack of preparation for this unexpected species. Towards the end of June all hope of destroying *C. italicus* was abandoned, and measures were directed—with considerable success—to reducing the amount of injury. Measures against *C. italicus* should be made compulsory on the landowners affected.

Locusts in Bulgaria during 1923.— *Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 2, pp. 470–471. Rome, April-June 1924.

The number of locusts in Bulgaria in 1923 was not large enough to warrant a campaign being organised. Locusts (probably *Calliptamus*

italicus, L.) caused little injury in the few villages where they appeared. *Gryllus campestris*, L., was more common in the north-west of Bulgaria, but did no appreciable harm.

Solowiow (P.). **Beobachtungen über neue Arten der Gattung** *Chermes* : *Chermes alaeviridis*, **n.sp., und** *Chermes niger*, **n.sp. (Rhynchota, Phytophthires, Aphidae, Phylloxeridae).** [Observations on new Species of *Chermes*.]—*Zool. Anz.*, lx, no. 1–2, pp. 38–49, 7 figs. Leipzig, 20th June 1924.

The various species of *Chermes* that cause galls on fir in the province of Mohilev, Western Russia, are discussed, with a key, and all stages of *Chermes alaeviridis*, sp.n., and *C. niger*, sp.n., are described, with notes on their life-history and development.

Speyer (E. R.). **Entomological Investigations.**—*Nursery & Mkt. Gdn. Ind. Devpmt. Soc. Ltd., Exptl. & Res. Sta. 9th Ann. Rept., 1923*, pp. 69–81. Cheshunt, Herts, 1924.

There is reason to believe that *Tetranychus telarius*, L. (red spider) selects dry places in which to pass the winter, which would account for soil being avoided for hibernation. The first attack in propagating houses was noticed shortly after the middle of January, the eggs being laid on the first, second and third leaves of the cucumber plants. On plants kept under normal conditions this attack died down almost completely by the middle of February, but on some plants, grown in pots and watered sparingly, breeding continued until March, when the mites assumed a red colour and left the plants. This attack had died down by the middle of March, but ten days later a large number of red forms invaded the leaves and developed rapidly. On 2nd April hibernating adults were found on a leafless rhododendron-azalea hybrid in a cold frame ; these individuals wandered to various leafy plants in the frame the next day. The main attack lasted from about 20th April to September. During November both red and non-hibernating adults occurred ; the eggs laid at this time and the larvae developed more slowly. After winter treatment with cresylic acid and soft soap the cucumber houses were clear of infestation throughout the season except for some pot-plants infested in January. During 1923 *T. telarius* was recorded for the first time as infesting tomato houses, the attack being general but never reaching serious proportions. Neither variety of plant nor manurial treatment appeared to influence the attack.

Fumigation experiments with various substances are described, from which it is concluded that gases and volatile liquids are ineffective owing to the difficulty of keeping up a comparatively high concentration of the vapour long enough to kill the mite. Naphthaline, when heated, is best suited for the purpose, provided that, within broad limits, the amount of its vapour in the atmosphere can be controlled so that no injury is caused to the plants. Naphthaline vapour is given off too quickly when flake naphthaline is dissolved in a liquid and distributed on the pipes. Solid naphthaline distributed on the pipes at the approximate rate of 2 lb. to each 1,000 cu. ft. space was tried, but only pot-plants were available at the time. The pipe temperature ranged

from 68° F. to 98° F. and the atmosphere from 55° F. to 78° F., over a period of 4 days. At the end of this time there was still a strong odour of the naphthaline, the plants were but little scorched, and all the mites appeared to be dead.

The great value of cresylic acid and soft soap as a winter treatment cannot be disputed, but its action apparently depends almost entirely on contact, which is promoted by the soap. Fumigation with cresylic acid, naphthaline or sulphur dioxide as a means of controlling hibernating individuals proved ineffective, except when the sulphur was burnt on a bright morning, in which case the mites on exposed plants were killed.

Hot water treatment and various other sprays were tested, but none proved effective.

Observations on the habits of *Armadillidium speyeri*, Jackson (cucumber-house woodlouse) have been continued [*R. A. E.*, A, xi, 351 ; xii, 127]. Of the various fumigants tested for destroying this pest in the soil (in which they are able to pass the winter even when exposed to frost) phenol was found to be of most value. Applied at the rate of 1 part to 1,000 parts of soil it killed all the woodlice introduced up to 2 days after mixing. With higher concentrations of 1 to 750 and 1 to 500 parts of soil they were killed up to the 15th day or even longer, though these had a retarding effect on the tomato seed. Experiments are now being made with commercial phenol, as the pure compound is too expensive for economic use. Phenol used as a winter spray in houses is no more effective than the cresylic acid-naphthaline mixture, and the cost would be prohibitive.

In experiments with poison baits neither bread nor flour showed any appreciable advantage over oatmeal [*R. A. E.*, A, xi, 351], the best results being obtained with 50 parts oatmeal, 1 part potassium bichromate, 2 parts glucose and 30 parts water. The poison is best distributed in the bait in the form of a solution. Sodium fluoride and Paris green had no effect on woodlice. As a deterrent commercial pyridine (40–60 per cent.) was tried in the soil closely surrounding the plant stems, but nothing less than 3 fluid oz. was effective, and that only for a few days.

Miles (H. W.). **The Apple Blossom Weevil.**— *Ann. Rept. Agric. & Hortic. Res. Sta., Long Ashton, Bristol, 1923*, pp. 58–61, 3 pls. Bath [1924].

A description is given of the various stages, life-history and control of *Anthonomus pomorum*, L., in Britain [*R. A. E.*, A, x, 607 ; xii, 101]. As this weevil is very widespread and destructive co-operative measures are necessary, and it is therefore recommended that growers' associations should take action against it on those lines.

Falkner (H. J.). **Dissection for Acarine Diagnosis.**—*Bee World*, vi, no. 2, pp. 30–31, 5 figs. Benson, Oxon, July 1924.

A method of dissection is described and illustrated which is designed to enable the presence of Acarine disease of bees to be diagnosed by the aid of a microscope without a detailed knowledge of bee anatomy.

Amans (—). **La lutte contre les Courtilières.**—*Progr. agric. & vitic.*, lxxxii, no. 29, pp. 67–72, 3 figs. Montpellier, 20th July 1924.

A general account is given of the structure and habits of the mole-cricket [*Gryllotalpa gryllotalpa*], and various measures of controlling it are reviewed.

Voukassovitch (P.). **Sur la biologie d'un Chalcidide, hyperparasite des Tachinaires d'***Oenophthira pilleriana*, **Schiff.**—*Bull. Soc. Hist. nat. Toulouse*, lii, no. 1, pp. 1–4, 2 figs. Toulouse, 1924.

In 1923, pupae of Dipterous parasites of *Sparganothis* (*Oenophthira*) *pilleriana*, Schiff., were parasitised in Haute Garonne by two Chalcids, *Habrocytus fasciatus*, Thoms., and *H. obscurus*, Dalm., the latter being the more numerous. Experimentally *H. obscurus* oviposited on pupae of *Calliphora* (*vomitoria ?*) and of *Lucilia caesar*. At about 29° C. [84° F.] its life-cycle takes 18 days, but is much longer at a lower temperature. In temperate regions, therefore, only a few generations can be produced in a year. *H. obscurus* was noted, in one instance only, as a parasite of *Chalcis intermedia*, Nees, a primary parasite of *S. pilleriana*.

Kopp (A.). **Les Derris insecticides.**—*Rev. Bot. app. & Agric. colon.*, iv, Bull. 34, pp. 400–402. Paris, 30th June 1924.

This paper briefly reviews work concerning the insecticidal properties of derris.

Prioton (C.). **Les Sauterelles en Charente.**—*Jl. Agric. prat.*, xlii, no. 28, p. 31. Paris, 12th July 1924.

Italian locusts [*Calliptamus italicus*, L.] have been recorded from various localities in Charente, and as the season is too advanced for the application of the soap and oil spray recommended during the invasion in 1901–1902, it is suggested that a sheet trap should be employed. The sheet (about 10 by 3 yds.) is held vertically, facing the sun as much as possible, and with half of its width trailing on the ground. The locusts are then driven on to it, after which it is drawn over them.

Malenotti (E.). **Mosca tedesca e varietà di grano.** [*Mayetiola destructor* and Varieties of Wheat.]—*Agricoltura Veneta*, reprint, 1 p. 14th June 1924.

In a serious outbreak of *Mayetiola destructor*, Say, it was observed that a loss of about 80 per cent. occurred with a French variety of wheat, whereas it was only 30–40 per cent. in the case of a local one.

Malenotti (E.). **Infestioni entomatiche a Lonigo.** [Insect Infestations at Lonigo.]—*Agricoltura Vicentina*, no. 6, reprint, 15 pp., 2 pls., 3 figs. Vicenza, June 1924.

The Scolytid, *Ips typographus*, L., did considerable harm to park trees in 1923 owing to the unusual drought of 1921 and 1922. Spruce (*Picea excelsa*) was the preferred food-plant, but pines (*Pinus sylvestris* and *P. pinea*) were attacked also. Trap trunks were used and barked in May. It was noticed that development was retarded in bark

exposed to the sun. Moreover, such bark dried quickly and became unattractive. In the case of *P. sylvestris* the attack was limited to the formation of hibernation mines by adults that had reached maturity in autumn. Larval mines are quite exceptional, and this shows that very few eggs are laid in *P. sylvestris*, which should not, therefore, be used for trap-logs, at least where *Picea excelsa* is present. *Pityogenes chalcographus*, L., is often associated with *I. typographus*, though it is apparently not injurious at Lonigo.

The Carabid, *Zabrus tenebrioides*, Goez., destroyed some fields of wheat. The Noctuid, *Euxoa segetum*, L., was destructive to beet. It is suggested that a trench should be dug round fields, which should then be manured with kainit, the effect of which would be to drive the cutworms into it. The beet-fly, *Pegomyia hyoscyami*, Panz., cannot be dealt with by means of insecticides. A good method consists in the early planting of beet as a trap-crop.

Pentaphis trivialis, Pass., damaged fields of wheat to such an extent that they had to be used for other crops. As this Aphid is favoured by ants, the eradication of their nests and the removal of weeds should be carried out against it.

The discovery of *Euphilippia olivina*, Berl. & Silv., in May on olives at Lonigo is the first record of this scale from the north of Italy.

Feytaud (J.). **Le fléau de chenilles dans les forêts de chênes verts de l'Espagne.**—*Actes Soc. Linn. Bordeaux*, lxxv, reprint, 67 pp., 3 figs. Bordeaux, 1923. [Received 21st July 1924.]

The distribution of evergreen oak (*Quercus ilex*) as found by the author on a journey in Spain is described. Some of the Lepidopterous pests that attack it are:—The Noctuids, *Dryobota furva*, Esp., *D. monochroma*, Esp., *Catocala nymphaea*, Esp., and *C. nymphagoga*, Esp.; the Lasiocampid, *Malacosoma neustria*, L.; the Liparids, *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), and *Porthetria* (*Lymantria*) *dispar*, L.; the Tortricids, *Tortrix viridana*, L., and *T.* (*Cacoecia*) *xylosteana*, L.; and the Lycaenid, *Zephyrus quercus*, L.

The remedial measures adopted in Spain and elsewhere are reviewed, with particular emphasis on biological control, notes on numerous parasites from different parts of the world being given.

Noneli y Comas (J.). **La Mosca de los Frutos** (*Ceratitis capitata*, **Wiedm.**).—*Bol. Agric. Téc. y Econ.*, xvi, no. 186, pp. 567–574, 2 figs. Madrid, 30th June 1924.

This account of the Mediterranean fruit-fly, *Ceratitis capitata*, Wied., briefly describes its various stages, biology and control. Grapes from the Spanish province of Almeria are prohibited from entering the United States of America owing to the occurrence of this pest in them [*R. A. E.*, A, xii, 123].

Reports on the State of Crops in each Province of Spain on the 20th of June 1924.—*Bol. Agric. Téc. y Econ.*, xvi, no. 186, pp. 583–601. Madrid, 30th June 1924.

In Almeria the almond crop has been severely injured, and even destroyed in some localities, owing to infestation by the Zygaenid, *Aglaope infausta*. In Badajoz the attacks of *Tortrix viridana* have

decreased the acorn crop considerably. In Santander fruit trees are infested by *Ceratitis hispanica*, against which resinous sprays are advised. Birds and *Pimpla pomorum* are of considerable assistance against this fruit-fly.

ZOLK (K.). *Paracodrus apterogynus*, **Halid., kui tumeda viljanaksuri** (*Agriotes obscurus*, **L.**) **tõukude uus parasiit.** [*P. apterogynus*, a new Parasite of *A. obscurus*.]—*Tartu Ulikooli Entomoloogia-katsejaama teadaanded*, nr. 3, 10 pp., 6 figs. Tartu, 1924. (With a Summary in German.)

The Proctotrupid, *Paracodrus apterogynus*, Hal., was obtained from a number of larvae of *Agriotes obscurus*, L., forming part of large batches of larvae of *Agriotes* and *Corymbites* bred by the author in 1923 in Esthonia. In most instances the pupae of the Proctotrupid protruded from the dead bodies of wireworm larvae that were ready for pupation.

AHLBERG (O.). **Några hittills obeaktade, ekonomiskt viktiga Tripsar.** [Some hitherto disregarded Thrips of economic Importance.]—*Medd. Centralanst. försöks. jordbruks.*, no. 263 (Ent. avdel. no. 42), 23 pp., 18 figs., 1 col. pl. Stockholm, 1924. (With a Summary in German.)

During the last two years damage, sometimes of considerable extent, has been done in Sweden by five species of thrips previously unknown as pests there.

Thrips fuscipennis, Hal., attacks the buds and flowers of roses, especially tea roses. *T. tabaci*, Lind., and its variety *pullus*, Uzel, have severely injured *Dianthus* and *Asparagus*, the leaves as well as the flowers being attacked. *T. nigropilosus*, Uzel, injures the leaves of *Chrysanthemum* and of cucurbitaceous plants, but it is only on the former that any real harm is done. *T. angusticeps*, Uzel, destroyed recently sown kohl-rabi. *Scirtothrips longipennis*, Bagn. (*Euthrips parvus*, Moult.), attacked *Begonia* in the manner described in Denmark [*R. A. E.*, A, xi, 319].

Sprays often proved ineffective owing to the sheltered position occupied by these pests, but on foliage plants nicotine preparations give good results. Where thrips are out of reach, fumigation is the only feasible measure. The use of hydrocyanic acid gas is hampered by official regulations. The value of tetrachlorethane cannot be definitely decided at present, but its slow rate of evaporation makes a large evaporation surface necessary.

In an appendix are described the hitherto unrecorded larval and pupal stages of *T. fuscipennis*, the pupal stages of *T. nigropilosus*, and the larval stages of *T. angusticeps* and *S. longipennis*.

KEMNER (N. A.). **Krusbärsstekeln** (*Pteronus ribesii* **Scop.**) **och dess framträdande de senare åren.** [*P. ribesii* and its Occurrence in recent Years.]—*Medd. Centralanst. försöks. jordbruks.*, no. 265 (Ent. avdel. no. 43), 33 pp., 13 figs. Stockholm, 1924. (With a Summary in French.)

In the south of Sweden *Pteronus ribesii*, Scop., has 3 generations a year. In 1922 larvae appeared at the end of May or early June, in July, and at the end of August or early September. In central Sweden

unfavourable weather may delay the first generation so that only 2 may occur, this being the normal number in the north of Sweden. The maximum number of eggs per female is 65. Incubation lasts 7–14 days, the larval stage 19–27, the pupal stage 8–14 and complete development 43–74, except in the case of the last generation (either the second or the third), which hibernates in the pupal stage. The first generation usually yields more males than females, so that in this generation parthenogenesis, which commonly occurs in this species, is less marked. In 1922–1923 natural enemies were unimportant in spite of favourable weather. Those noticed were *Microcryptus nigrocinctus*, Grav., *Ichneutes reunitor*, Nees, and *Neliopisthus elegans*, Ruthe. Spraying with copper arsenite at a strength of ½ per mille, or lead arsenate at 1–2 per mille, gave good results.

Eggers (H.). **Neue Borkenkäfer (Ipidae) aus Afrika. (Nachtrag II)** [New Bark-beetles from Africa. Supplement II.]—*Ent. Blätter*, xx, no. 2, pp. 99–111. Berlin, 30th June 1924.

Among the new Scolytids described are *Stephanoderes punctatus*, *S. polyphagus* and *Xyleborus barumbuensis*, from cacao, and *Coccotrypes nigripes* and *C. congonus* from palm nuts, all from the Belgian Congo.

Wilke (S.). **Ueber Lebensweise und Verbreitung des zottigbehaarten Blütenkäfers** *Epicometis hirta* **Poda (Col., Cet.) in Deutschland.** [On the Life-history and Distribution of *E. hirta* in Germany.] — *Ent. Blätter*, xx, no. 2, pp. 113–125, 1 map, 14 figs. Berlin, 30th June 1924.

In April 1924 the Cetoniid, *Epicometis hirta*, Poda, was injurious to rape in Hessen. It has been recorded in Germany as a pest of the blossoms of apple, pear, cherry, strawberry, vine, rye, beans, rape, etc. The adults mate 3–4 days after emergence from hibernation, and oviposition starts early in May. Incubation takes about a week. The larval stage lasts not more than 2 months, and pupation occurs in July and August. It is completed in about a fortnight, but the adults hibernate in the earthern pupal chamber ; in a few cases pupal hibernation occurs. Climatic factors are held responsible for the occasional mass-occurrence of *E. hirta* in Germany.

Miczyński jun. (K.). *Chlorops taeniopus* **Meig. auf** *Aegilops*-**Arten.** [*C. taeniopus* infesting species of *Aegilops*.]—*Zeitschr. Pflanzenkr. & Gallenk.*, xxxiv, no. 3–4, p. 108. Stuttgart, 1924.

The summer generation of *Chlorops taeniopus*, Mg., is a recognised pest of cultivated wheat, barley, rye and oats, and it is now recorded from Cracow, on grasses of the genus *Aegilops*.

Mansfeld (K.). **Der Koloradokartoffelkäfer im Klima Deutschlands.** [The Colorado Potato Beetle in the Climate of Germany.]— *Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 7, pp. 45–46. Berlin, 1st July 1924.

The spread of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in France raises the question whether it can establish itself under the climatic conditions obtaining in Germany. In western and southern Germany no climatic hindrance appears to exist, but north-

east Germany does not appear likely to suit this pest. It is probable that only one generation would occur in a year, but this fact is not of sufficient importance to justify the slightest neglect of the most drastic repressive measures immediately any occurrence of the pest is noticed.

VOGT (E.). **Bekämpfung des Koloradokäfers.** [Measures against the Colorado Beetle.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 7, pp. 46–47. Berlin, 1st July 1924.

In view of the danger of the introduction into Germany of *Leptinotarsa decemlineata*, Say, an account is given of the recognised methods for combating it.

WERTH (E.). **Blütezeit und Apfelblütenstecher.** [The Blossom Period and the Apple Blossom Weevil.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 7, pp. 47–48. Berlin, 1st July 1924.

It is commonly assumed that early-blossoming varieties of apple are those chiefly attacked by *Anthonomus pomorum*, L., but this is not always the case, and observations show that late-blossoming varieties may be attacked, though this is less likely in the case of varieties with a short blossoming period. Pears owe their freedom from attack to the fact that they bloom too early.

DE LIMA CAMARA (A.) & SILVEIRA GRILLO (H. V.). **A Phylloxera.**—*Bol. Minist. Agric. Ind. e Comm.*, xii (1923), no. 4, pp. 81–107, 49 figs. Rio de Janeiro, 1924.

An account is given of *Phylloxera vastatrix*, containing historical, geographical and biological information and descriptions of the various methods employed against it.

KRIEG (—). **Der Rebstecher, seine Biologie und seine Bekämpfung.** [*Bycticus betulae*, its Biology and Control.]—*Wein u. Rebe*, vi, nos. 2–3, reprint, 27 pp., 4 figs. Mayence, June–July 1924.

The weevil, *Bycticus betulae*, L., occurs in all the vine-growing districts of Germany and occasionally causes great losses. The various stages and the life-history, as observed in 1922, are described. On first appearing in spring the weevils feed for 8–10 days before mating. The sexes are about equal in numbers. Immediately after mating the female begins rolling the leaves. This operation, which requires 3–5 hours, is described at length. In 6 days the number of rolls per female varied from 9 to 11, and the number of eggs, from 35 to 40. The oviposition period lasts at least 15 days. *B. betulae* is polyphagous, tender and smooth leaves being preferred. Natural enemies are not abundant or peculiar to *B. betulae*, so that their importance is very slight, and weather conditions appear to be the only factor capable of ending an outbreak. Collection of the rolls is better than that of the weevils, but neither is really satisfactory. Spraying with arsenical solutions gives a practical result. Sturm's preparation has a very rapid action, though the effect of Urania green is more lasting, the former being preferable in dry weather.

Wülker (G.). **Nematodes.**—*Biol. Tiere Deutschlands*, Teil 8, pp. 1–64, 25 figs. Berlin, Borntraeger, 11th July 1924. Price 1*s.* 8*d.*

This section of a general treatise already noticed [*R. A. E.*, A, xi, 199] deals with the structure, life-history and distribution of Nematodes, special attention being paid to their infestation of plants and animals, both vertebrate and invertebrate.

Hase (A.). **Beiträge zur Kenntnis des Geschlechtslebens männlicher Schlupfwespen.** [Contributions to the Knowledge of the sexual Life of Male Hymenopterous Parasites.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 5, pp. 339–346, 1 fig. Berlin, May 1924.

Species of the Braconid genus *Habrobracon* are of importance in the biological control of insect pests, and it is possible to breed them on a large scale. A knowledge of the biology of the males is therefore valuable, as only completely fertilised females produce female progeny.

The experiments described in this paper were made with *H. juglandis*, Ashm., and the following results were obtained :—The males are fully mature sexually immediately after emergence. One male mated 28 times. Some matings do not fertilise the female concerned. The mating impulse lasts throughout the life of the male, but power to fertilise doubtless decreases with age. Somewhat old males can fertilise much younger females, but for breeding purpose only young males should be used. In these experiments the 28 females fertilised by the one male produced 598 females (besides 706 males).

Hase (A.). **Ueber den Stech- und Legeakt, sowie über den Wirtswechsel von** *Lariophagus distinguendus.* **Chalcididae. Pteromalini.** [Oviposition and Change of Host of *L. distinguendus.*]—*Naturwissenschaften*, xii, no. 20, pp 377–384, 3 figs. Berlin, 16th May 1924.

A striking example of a useful insect becoming harmful through change of host is to be seen in *Lariophagus distinguendus*, Först. It oviposits not only in the larvae and pupae of *Calandra granaria*, L., and *Sitodrepa panicea*, L., but also in those of *Habrobracon juglandis*, Ashm. (previously recorded as *H. brevicornis*, Wesm. [*R. A. E.*, A, x, 566 ; *cf.* also x, 424]), a parasite of the meal moth [*Ephestia kühniella*, Z.] and related species. In experiments as many as 62 per cent. of the Braconids accessible were parasitised by this Chalcid.

Lüstner (G.). **Stärkeres Auftreten der Lüzernegallmücke** (*Dasyneura ignorata* **Wachtl**) **und der Luzernefliege** (*Phytomyza affinis* **Fall.**) **im Rheingau.** [An Outbreak of the Lucerne Gall-midge and Lucerne Fly in the Rhine Province.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 8, pp. 53–54, 2 figs. Berlin, 1st August 1924.

In the Rhine Province the galls of *Dasyneura ignorata*, Wachtl, on lucerne had not been previously noticed, but in 1924 they were to be seen everywhere. They occur at the tips of the main and side shoots, being much enlarged buds surrounded by the thickened and enlarged side-leaves. These onion-shaped, whitish-green galls contain the larvae. Up to 7 larvae were found in one gall early in June. By mid-June

many galls were empty, the larvae having migrated to the ground to pupate.

The lucerne fly, *Phytomyza affinis*, Fall., the larvae of which mine the leaves, is met with every year in moderate numbers, but in 1924 it was very abundant.

Neither of these flies does much damage, attention being drawn to them simply on account of their abundance.

WILKE (—). **Gallmücken an Luzerne und Getreide.** [Gall-midges on Lucerne and Cereals.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 8, p. 54. Berlin, 1st August 1924.

Besides *Dasyneura ignorata*, Wachtl, which has been abundant on lucerne in Silesia, and parts of Prussia, the Hessian fly, *Mayetiola destructor*, Say, has done local injury to winter cereals, such as rye, in Mecklenburg, Pomerania and Brandenburg. As a rule the pupae occur at the end of July, but this year they were observed early in that month, so that the second generation is likely to appear before the usual time, which is the end of August or early in September.

DYCKERHOFF (F.). **Die Rübenblattwanze** (*Zosmenus quadratus* **Fieb.**). [The Beet Leaf Bug, *Z. quadratus*.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 8, pp. 54–56, 3 figs. Berlin, 1st August 1924.

This year the infestation by the beet leaf bug in Anhalt [*R. A. E.*, A, xi, 434] has again been severe, and this led to a study of the bugs of the genus *Zosmenus* occurring on *Chenopodium* spp. It was found that the bug injurious to beet is *Z. quadratus*, Fieb., and not *Z. capitatus*, Wolff, as hitherto stated. The structural differences between these two species are briefly described and figured. *Z. capitatus* also occurs, but in the observations made it only fed on beet if *Atriplex* was not available. Experiments are now being conducted to ascertain if it can develop on beet. Another bug, supposed to be a form of *Z. capitatus*, the author believes Fiebiger to have rightly treated as a distinct species, *Z. anticus*, Steph.

TRAPPMANN (W.). **Bodendesinfektionsversuche mit Neutralölen als Beitrag zur Koloradokäferbekämpfung.** [Experiments in the Disinfestation of Soil with Neutral Oils as a Contribution to the Control of the Colorado Potato Beetle.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 8, p. 56. Berlin, 1st August 1924.

The risk of importation into Germany of the Colorado potato beetle [*Leptinotarsa decemlineata*] renders it necessary that preparations be made against it in advance. The best measure known is the extreme one of destroying all the potato plants in an infested field by uprooting and burying them and watering the spot with crude benzol, and in harrowing the field and then watering it with crude benzol at the rate of about 1 gal. per sq. yd. In tests to determine the depth to which its effect extends, three " neutral oils," by-products of the manufacture of carbolic acid, were tested in the above quantities, 60 larvae of *Calosoma sycophanta* and 120 of *Oryctes nasicornis* being buried in wire cages or muslin bags at depths between 2 and 24 inches. These oils were found effective at depths varying from 8 to 16 inches. The dampness of the soil was found not to have any influence on the depth at which they were effective.

Werth (E.). **Zwetschenmotte und Rapsglanzkäfer als Kirschblütenzerstörer.** [The Plum Moth and the Rape Beetle as Destroyers of Cherry Blossoms.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 8, pp. 56–57, 3 figs. Berlin, 1st August 1924.

Though not previously recorded as pests of cherry blossom, the plum moth, *Argyresthia ephippiella*, F., and the rape beetle, *Meligethes aeneus*, F., can reduce the crop to a noticeable extent if present in very large numbers. The larva of the former bores into the calyx and the adult of the latter devours nearly the entire blossom.

Zacher (F.). **Die volkswirtschaftliche Bedeutung der Vorratschädlinge.** [The Economic Importance of Pests of Stored Foodstuffs.]—*Deutsche Kolonialwaren u. Lebensmittel Rundschau*, xxxii, nos. 89, 96, 100 [unpaged]. Berlin, 16th, 25th, 31st December 1923. [Received 8th August 1924.]

An account is given of the losses in food-stuffs in Germany through infestation by various pests, and the methods to be followed in combating them are outlined.

Zacher (F.). **Die Mehlmotte und ihre Bedeutung.** [The Meal Moth and its Importance.]—*Bäcker- und Konditor-Tageszeitung*, li, no. 55 [unpaged]. Berlin, 4th March 1924. [Received 8th August 1924.]

This article on the meal moth, *Ephestia kühniella*, Zell., and its control is written for the use of the bakery and confectionery trades.

Zacher (F.). **Genossenschaftswesen und Speicherschädlingsbekämpfung.** [The Co-operative System and the Control of Warehouse Pests.]—*Edeka Deutsche Handels Rundschau*, xvii, no. 13, pp. 361–362. [*sine loco*] 1924.

Under the present conditions the protection of food-stuffs from warehouse pests is of the highest importance in Germany, and co-operative societies are especially fitted for developing such work, as losses due to insect and other pests are not regarded by them merely as an incidental charge to be included in fixing costs.

Zacher (F.). **Der Speckkäfer.** [The Bacon Beetle.]—*Edeka Deutsche Handels Rundschau*, xvii, no. 19, pp. 614–615. [*sine loco*] 9th May 1924.

In Germany the bacon beetle, *Dermestes lardarius*, L., sometimes appears as early as the beginning of April. The author found eggs from 12th June to early August. In June incubation required 12 days and only 4–6 in August, after a spell of hot weather. Most of the bred larvae died, only one, a specimen that pupated on 22nd September, producing the adult—towards the end of December. It seems clear that only one annual generation of *D. lardarius* occurs in Germany. The measures to be taken against this pest includes capture, cheese being used as a bait; the pouring of benzine or benzol into cracks; or fumigation with carbon bisulphide, etc.

ZACHER (F.). **Der Brotkäfer, ein schlimmer Haushaltungsschädling.** [The Bread Beetle, a serious Household Pest.]—*Haus Hof Garten*, xlvi, no. 16, pp. 87–88, 4 figs. Berlin, 19th April 1924.

This is a popular article on the bread beetle [*Sitodrepa panicea*, F.].

[VERESHTCHAGIN (B.).] **Верещагинъ (Б.). Вредители сел.-хоз. растений въ Бессарабіи въ 1923 г.** [Pests of Agricultural Plants in Bessarabia in 1923.]—**фурника** [*Furnika*], no. 13–14, pp. 11–13 and 12–13. Kishinev, July 1924.

A large number of the pests have already been noticed from previous reports [*R. A. E.*, A, xi, 43, 149], additional records being :—*Ceuthorrhynchus macula-alba*, Hbst., on poppies ; the field pests, *Eurygaster maura*, L., *Agrotis* spp., and Elaterids ; *Hydrellia griseola*, Fall., in leaves of barley ; *Pentodon idiota*, Hbst., and *Tetraneura rubra*, Licht., on maize ; the vegetable pests, *Phyllotreta atra*, F. (*aterrima*, Schr.), and *Gryllotalpa gryllotalpa*, L. ; *Porthetria* (*Lymantria*) *dispar*, L., on fruit trees ; *Neurotoma flaviventris* Retz. (*Lyda pyri*, Sehr.) on pears ; *Zeuzera pyrina*, L., in stems of fruit trees ; *Cydia* (*Grapholitha*) *funebrana*, Tr., and *Hyponomeuta variabilis*, Zell., on plum ; *Papilio podalirius*, L., on leaves of apricot, peach and plum ; and *Athalia glabricollis*, Thoms., on *Iris*.

VAN DUZEE (E. P.). **Characters of two North American Chermidae.**—*Pan-Pacific Ent.*, i, no. 1, pp. 22–23. San Francisco, Cal., July 1924.

The new Psyllids are *Kuwayama lavaterae*, on *Lavatera assurgentiflora*, causing the leaves to curl, and *Aphalara martini*, occurring in great numbers on *Frankenia grandifolia*, both in California.

FERRIS (G. F.). **The Nymphs of two Species of Chermidae (Hemiptera).**—*Pan-Pacific Ent.*, i, no. 1, pp. 24–28, 2 figs. San Francisco, Cal., July 1924.

The nymphs of *Kuwayama lavaterae*, Van Duz., and *Aphalara martini*, Van Duz., are described, this paper forming one of a series in which it is proposed to deal with the immature stages of Psyllids.

ESSIG (E. O.). **Economic Notes.**—*Pan-Pacific Ent.*, i, no. 1, p. 45. San Francisco, Cal., July 1924.

Melamomphus sordidus, Horn, occurred in large numbers on commercial currant patches during April 1924 in California, the bark being almost entirely stripped over an area of 2 acres.

Pyrameis (*Vanessa*) *cardui*, L., and *V. carye*, Hb., have been unusually abundant in central and southern California, the caterpillars occurring on many cultivated plants.

The hibernating form of *Eriophyes pyri*, Pag. (pear-leaf blister-mite) caused considerable damage in California in many orchards by destroying the interior of the buds during the warm period of February. Owing to the lack of rain, spraying had been delayed until December and January, and was applied too late for control.

The centipede, *Scutigerella immaculata*, Newp., which is a serious pest of asparagus in California, is becoming increasingly important as a garden and field crop pest in many of the Western States. Flooding and soil fumigants are giving satisfactory results.

Snyder (T. E.). **Tests of Methods of Protecting Woods against Termites or White Ants. A Progress Report.**—*U.S. Dept. Agric.*, Dept. Bull. 1231, 16 pp., 2 pls., 3 figs. Washington, D.C., 26th June 1924.

A number of experiments in protecting wood from damage by termites are described. The most effective preservative for timber to be set in the ground is coal-tar creosote. Superficial treatment or a more expensive but more permanent impregnation can be practised, according to the length of service required. Impregnation by the open-tank method with coal-tar creosote renders the wood resistant to termite attack for at least 15 years, while the full-cell pressure process ensures resistance for at least 25 years. These processes are not described. The latter method is recommended for wood being exported for use in the tropics. Brushing several coats of coal-tar creosote on timber will add from 2 to 5 years to its length of service, and pigments may be added to give the wood a painted appearance. For interior wood work and furniture, impregnation with zinc chloride, mercury bichloride, sodium fluoride or chlorinated naphthaline is effective; the wood can be painted after such treatments. The cheaper woods used for the inner parts of furniture, etc., can be treated with preservatives during manufacture and then overlaid with veneers of termite-resistant woods. Crude carbolic acid and coal-tar creosote can be effectively added to wood-pulp products during manufacture.

Snyder (T. E.) & Zetek (J.). **Damage by Termites in the Canal Zone and Panama and how to prevent it.**—*U.S. Dept. Agric.*, Dept. Bull. 1232, 25 pp., 10 pls., 1 fig. Washington, D.C., 27th June 1924.

Much of the information contained in this paper has been noticed from other sources [*R. A. E.*, A, x, 192; xii, 160]. An account is given of the more important termites of Panama and the injury they do.

A termite exterminator that has been found successful in the Philippine Islands is prepared as follows: To a 5 U.S. gal. can of kerosene oil is added 100 c.c. of a saturated mixture of white arsenic in hydrochloric acid (about 1 part acid to 1 part water). The can should be tilted so that the arsenic solution gathers in one corner; 50 c.c. of concentrated sulphuric acid should then be added; this will withdraw water from the hydrochloric acid and will saturate the kerosene with hydrochloric acid gas containing arsenic trichloride. This process is dangerous and should be done in the open, and the operator must avoid breathing the fumes produced. When the reaction has stopped, the solution is ready for use, and is applied by painting or spraying on wood surfaces. It may also be injected into wood. As it will corrode a kerosene tin, it should be stored in a glass receptacle.

It is suggested that further tests might well be made with chloropicrin for mound-building termites, and also with paradichlorobenzene, crystals of which could be placed at the openings of subterranean nests. Dry heat seems to have a fatal effect on Kalotermitids. Fumigation with 12 oz. of sodium cyanide per 1,000 cu. ft. has also been tried with success in closed buildings. Infested wood can be swabbed with such mixtures as poisoned kerosene emulsion or miscible oil, 1 oz. sodium arsenite being added to each gallon of the water used for diluting the stock mixture.

(K1986) Wt.P.23/D16 1,500 10/24 H & Sp Gp 52

Observations suggest that *Nasutitermes ephratae*, Holmg., which has been found working inside the trunk of a coconut palm (*Cocos nucifera*), may act as a mechanical carrier of the Nematode, *Aphelenchus cocophilus*, which causes red-ring disease of these palms.

DA COSTA LIMA (A.). **Descripção de uma nova especie do genero *Rhatymoscelis* Thom. (Coleopt. Cerambycidae).** [Description of a new Species of the Genus *Rhatymoscelis*.]—*Bol. Soc. ent. Brasil*, 1922, pp. 21–23. Rio de Janeiro, 1922.

Rhatymoscelis melzeri, sp.n., was taken boring in the trunk of guava in Brazil.

DE AZEVEDO MARQUES (L. A.). **A praga da bananeira no Rio de Janeiro. (Biologia do *Cosmopolites sordidus* Germar.).** [The Pest of the Banana in the State of Rio de Janeiro. The Biology of *C. sordidus*.]—*Bol. Soc. ent. Brasil*, 1922, pp. 24–32, 2 figs. Rio de Janeiro, 1922.

This is a brief account of the life-history of *Cosmopolites sordidus*, Germ., and of the measures to be taken to combat it. This banana pest was first recorded in Brazil in 1918.

GOWDEY (C. C.). **Report of the Government Entomologist.**—*Ann. Rept. Dept. Agric., Jamaica, 1923*, pp. 20–22. Kingston, 1924.

Cosmopolites sordidus, Germ. (banana borer) was very prevalent in Jamaica in 1923, the year being one of drought, though where regular remedial measures were carried out the insect was held in check. Laboratory experiments included poisoning pieces of the corms with Paris green and sodium arsenite, which killed 80–90 per cent. of the weevils in 24 hours. In practice, however, they would probably refuse the poisoned corms when an ample supply of food was available. Various tests indicated that the adults are unable to fly [but *cf. R. A. E.*, A, xii, 408]. Immersion of infested suckers for 24 hours in water killed most of the insects in the immature stages and those not buried in the centre of the suckers. *Pseudococcus bromeliae*, Bch. (pineapple mealybug) was found on one estate in the tunnels of *C. sordidus* in old corms.

On *Citrus*, *Aleurocanthus woglumi*, Ashby (citrus black fly) was as prevalent as usual, and the same may be said of *Lepidosaphes beckii*, Newm. (purple scale), and *Hemichionaspis* (*Chionaspis*) *minor*, Mask. (snow scale), both of which can only be successfully controlled by fumigation with hydrocyanic acid gas. Coconut pests included the Coccids, *Diaspis boisduvali*, Sign., and *Pseudoparlatoria parlatorioides*, Comst., as well as the Scolytid, *Xyleborus perforans*, Woll., attacking diseased stems.

The life-histories of the two chief tobacco cutworms have been worked out. *Prodenia ornithogalli*, Guen., oviposits on the lower surface of the leaves, from 80 to 200 eggs being laid in a batch. These hatch in 4 to 6 days, and the larval stage is from 2 to 3 weeks. Pupation occurs in the soil and the adults emerge 2 or 3 weeks later. *Xylomyges sunia*, Guen., lays from 200 to 300 eggs in a cluster on the lower leaf surface, incubation lasting 4–7 days. The larval stage occupies 2 to 3 weeks; pupation occurs in the soil, and the pupal stage lasts from 10 to 14 days.

On sugar-cane one serious outbreak of *Diatraea saccharalis*, F. (sugar-cane moth borer) was reported. In one locality outbreaks of *Laphygma frugiperda*, S. & A., and of *Remigia punctularis*, Hb. (*Mocis repanda*, auct.) occurred. Stomach poisons, when practicable, proved very satisfactory in control.

Experiments to determine the relation of insects to sugar-cane mosaic were negative in the case of *Kolla herbida*, Wlk. (green leaf-hopper), *Stenocranus saccharivorus*, Westw. (West Indian cane-fly), and *Peregrinus maidis*, Ashm. They are nevertheless considered to be the most probable vectors of the disease, as no Aphid occurs in sufficient numbers on sugar-cane in Jamaica to be seriously implicated.

Other pests included *Euscepes batatae*, Waterh., a bug, *Spartocera fusca*, Thb., and a Cassid, *Chirida signifera*, Hbst., on sweet potatoes; the Coccids, *Aspidiotus hartii*, Ckll., and *Pseudococcus* sp., and the weevil, *Palaeopus costicollis*, Mshl. (*dioscoreae*, Pierce) on yams; *Ceroplastes cirripediformis*, Comst. (barnacle scale) on cassava; *Aspidiotus uvae*, Comst., on grape; *Chrysomphalus personatus*, Comst., on mango foliage; and the Cetoniid, *Gymnetis tristis*, F., on rose blooms and *Chrysomphalus aonidum*, L. (Florida red scale), *Selenaspidus articulatus*, Morg., and *Ceroplastes ceriferus*, And. (Florida wax scale) on rose stems. The life-history of *Nezara marginata*, P. de B. (green stink bug) on tomato was worked out. The eggs are laid in batches of 6 to 50 on the lower surface of the leaves of tomato, maize, tobacco and okra [*Hibiscus esculentus*], the incubation period being 5 to 8 days. The nymphal stage lasts from 24 to 36 days, and both nymphs and adults suck the juices from the young foliage and fruit.

BERMUDA. **Plant and Bulb Diseases and Pests Act, 1921.** Regulations, 1 p. 11th June 1924.

The appearance of any serious plant diseases or pests, including *Comstockiella sabalis* (palmetto scale) and *Diaspis* (*Aulacaspis*) *pentagona* (oleander scale), must be notified to the Director of Agriculture. The introduction into the Bermuda Islands of any part of the banana plant (except the fruit), citrus plants from the West Indies and the Bahamas, bulbs of the type of *Lilium longiflorum* and living plants of *Antirrhinum majus*, is prohibited. All plants, fruits and bulbs and other nursery stock and bananas, imported by post or otherwise, are liable to inspection and are fumigated at the owner's expense if it is deemed necessary. Regulations of 19th September 1921, amended 26th February 1923, are repealed.

GAHAN (A. B.). U.S. Bur. Ent. **Some new Parasitic Hymenoptera with Notes on several described Forms.**—*Proc. U.S. Nat. Mus.*, lxv, art. 4, no. 2517, pp. 1–23. Washington, D.C., 1924.

Nine new species of Chalcidoidea and two new species of Serphoidea are described, with notes on the synonymy, distribution and hosts of several described species. Among the Chalcidoids dealt with are *Lecaniobius capitatus*, sp.n., and *Eupelmus coccidivorus*, sp.n., from Panama, reared from *Ceroplastes* sp., one female of the latter having been also reared from *Saissetia nigra*, Nietn.; *Aphelinus sanborniae*, sp.n., from the Aphid, *Sanbornia juniperi*, Perg., in Pennsylvania; *A. jucundus*, sp. n., from *Macrosiphum solanifolii*, Ashm., and *A. aureus*, sp. n., from *Chaitophorus salicicola*, Essig, in California; *A.*

perpallidus, sp. n., from an Aphid on elm in Iowa; *Coccophagus ochraceus*, How. (*bifasciaticorpus*, Gir.), from *Lecanium* sp. on *Adenostema fasciculatum* in California, *L. hemisphaericum*, Targ., in South Africa, and *Saissetia oleae*, Bern., in both countries; *Aneristus ceroplastae*, How., of which *Coccophagus orientalis*, How., is considered as a synonym, the former having been described as parasitic on *Ceroplastes euphorbiae*, Ckll., in Jamaica, and the latter reared from *Ceroplastes actiniformis*, Green, and other Coccids in Ceylon; *Prospaltella diaspidicola*, Silv., said to be reared from a mulberry scale (doubtless *Diaspis* (*Aulacaspis*) *pentagona*, Targ.) in Japan and in Brazil; *Encarsia formosa*, sp.n., from pupae of *Trialeurodes vaporariorum*, Westw., in a greenhouse in Ohio; and *Tetrastichus blepyri*, Ashm. (*detrimentosus*, Gahan), normally a hyperparasite of various Coccids and Coccinellids, which is widely distributed in North America and probably occurs elsewhere.

Goodwin (J. C.) & Fenton (F. A.). **Morphological Studies on the Injury to Apple caused by** *Ceresa bubalus*.—*Phytopathology*, xiv, no. 7, pp. 334–335, 4 figs. Lancaster, Pa., July 1924.

Sections through typical one-year-old lesions made by *Ceresa bubalus* in apple trees show mechanical injury to be very severe. Decay often sets in as a result of the wounds made by the ovipositor of the female, which is inserted into the cambium and deep into the woody fibre, often penetrating almost to the centre of small branches; and though the wounds may eventually heal over, this secondary injury may kill the entire limb.

McLeod (C. H.). **The Pathological Anatomy of Tissue produced in** *Abies balsamea* **following an Attack of the Spruce Budworm.**—*Phytopathology*, xiv, no. 7, p. 345. Lancaster, Pa., July 1924.

Young shoots of *Abies balsamea*, when attacked by the spruce budworm [*Tortrix fumiferana*], redden and often die. The changes in the tissue due to this attack are described. The decrease in size of the growth rings is the only one visible macroscopically.

Evenden (J. C.). **Eastern Spruce Budworms in the West.**—*Timberman*, xxv, no. 2, pp. 53–54, 3 figs. 1923. (Abstract in *Expt. Sta. Record*, l, no. 8, p. 756. Washington, D.C., June 1924.)

Attention is drawn to the serious damage caused by *Tortrix* (*Cacoecia*) *fumiferana*, Clem., to balsam fir [*Abies balsamea*] and spruce [*Picea*] in the woods of Maine and Canada since 1910 and its occurrence in Idaho in 1922. In the Yellowstone National Park numbers of Douglas fir [*Pseudotsuga taxifolia*] and Engelmann spruce [*Picea engelmanni*] have been killed, these losses amounting to 75 per cent. on 50 to 100 acres or more. The food-plants recorded for this insect in the west are grand or white fir [*Abies grandis*], Douglas fir, Engelmann spruce, western larch [*Larix occidentalis*], western hemlock [*Tsuga heterophylla*], white pine [*Pinus strobus*], yellow pine [*P. ponderosa*], lodgepole pine [*P. murrayana*] and western cedar [*Juniperus occidentalis*].

HERBERT (F. B.). **The European Elm Scale in the West.**— *U.S. Dept. Agric.*, Dept. Bull. 1223, 19 pp., 6 pls., 6 figs. Washington, D.C., 10th July 1924.

Gossyparia spuria, Mod. (European elm scale) has long been known as a pest of elm in Europe and the Eastern United States and was first discovered in the west in 1893. Its distribution in the United States, Canada and Europe is reviewed and its history and synonymy are discussed. It was probably originally brought from Europe to America on young elm trees, and transported to the different States in infested elm stock. Birds, the Argentine ant (*Iridomyrmex humilis*, Mayr) and other ants are also responsible for a certain amount of its spread. Many different species and varieties of elm are attacked, and if the tree does not die, it appears eventually to develop a certain amount of resistance to injury.

The various stages are described, and details are given of the life and seasonal history [*cf. R. A. E.*, A, ix, 154]. Egg-laying starts about the end of May and continues into August. The eggs hatch in less than an hour after deposition, which may account for the erroneous statements that some of the females are viviparous. There is a definite relation between the scale and food-plant ; their hibernation ends about the same time, the semi-cocoons are completed by the time most of the leaves are full grown, and egg-laying starts two or three weeks later. There is only one generation a year.

The only record of parasites is that of R. A. Cooley in 1898, who reared half a dozen individuals at Concord, Mass., but they have never been described and still remain under the manuscript name of *Coccophagus gossypariae*, How. Attempts to obtain parasites from western material have been unsuccessful. Though several Coccinellids feed on this scale, they cannot be considered important agencies in its control. Those recorded are *Chilocorus bivulnerus*, Muls., *Rhizobius ventralis*, Erichs., *Hippodamia convergens*, Guér., and *H. convergens ambigua*, Lec. The green lacewing, *Chrysopa californica*, Coq., has also been reared from this scale and is found to some extent on infested elms.

Various experiments for the control of *G. spuria* are described, but most of the sprays used were not satisfactory. The measures recommended are a solid stream of water [*R. A. E.*, A, ix, 117] or a miscible oil spray. The latter should consist of 16 gals. miscible oil (23°–28°Bé.) to 184 gals. water. This may be applied with any sort of spray outfit that has power enough to reach the tops of the trees. Every branch and twig of the tree should be covered, but too much of the spray should not be allowed to settle at the base of trees as it might injure the roots. No damage to lawns or elms has been noticed. The spray is best applied in the winter up to the time when the buds begin to open. If properly done, it does not require to be repeated every year except on young trees, which apparently become reinfested easily when near unsprayed large trees. Though complete extermination cannot be hoped for, it should be possible to kill a sufficient number of the scales to prevent their appearance in large numbers the following season.

Other important pests of the elm in the west are the Cossid, *Prionoxystus robiniae*, Peck, which bores into the trunks and main limb, often killing large branches and occasionally whole trees ; and the Aphid, *Myzocallis ulmifolii*, Mon., and the leafhopper, *Typhlocyba* (*Empoa*) *ulmi*, L., both of which suck the plant juice from the leaves and produce an abundance of honeydew. *Galerucella luteola*, Mull.

(elm leaf beetle), though not yet a serious pest in Oregon, is one of the worst enemies of elm in the east, where it defoliates a great number of trees every year.

Drake (C. J.) & Fenton (F. A.). **Melon and Cucumber Insects.**—*Iowa Agric. Expt. Sta.*, Circ. 90, 8 pp., 11 figs. Ames, Iowa, May 1924.

The more important pests of melons and cucumbers in Iowa are *Aphis gossypii*, Glov. (melon aphis), *Anasa tristis*, DeG. (squash bug), *Melittia satyriniformis*, Hb. (squash vine borer), and *Diabrotica vittata*, F. (striped cucumber beetle). A brief account is given of the life-history and habits of these insects, and recommendations are made for their control, including instructions for the preparation of nicotine dust and the construction of a home-made mixer for it.

Other insects feeding on cucurbits are *Diabrotica duodecimpunctata*, Oliv. (cucumber beetle), *Lygus pratensis*, F. (tarnished plant bug), *Epilachna borealis*, F. (squash ladybird), and *Diaphania nitidalis*, Cram. (pickle-worm).

Reed (W. V.). **Annual Report of the State Entomologist for 1921.**

Williams (I. W.). **Annual Report of the State Entomologist for 1922.**—*Georgia State Bd. Ent.*, Bulls. 63 & 64, 11 & 10 pp. Atlanta, Ga., June 1922 and 1923. [Received 16th August 1924.]

The principal features of these two reports have been noticed from other publications. A list of the chief quarantine regulations in force is given.

Beyer (A. H.). **Life History of the New Citrus Aphis.**—*Florida Ent.*, viii, no. 1, pp. 8–13. Gainesville, Fla., July 1924.

Details are given of both laboratory and field observations on the habits of the new citrus aphis [*R. A. E.*, A, xii, 397, 405]. The winged and wingless viviparous females are described, and an account is given of the various instars and the process of moulting, the food-plants and the nature of attack.

Natural enemies appear to be of less value in the control of this Aphid than of any other studied by the author. This is probably due to several causes, such as the recent introduction of the species or the influence of metereological conditions. Natural enemies additional to those previously mentioned are the Coccinellids, *Cycloneda sanguinea* and *Scymnus binaevatus*, the larvae of the Syrphids, *Allograpta obliqua* and *Lysiphlebus testaceipes*, and a species of *Chrysopa*.

Wherever ants, especially a species of *Camponotus*, were numerous, the Aphids also occurred in large numbers. In the absence of ants many of the nymphs became entangled in the honey-dew, causing the weaker individuals to perish.

In control experiments [*cf. R. A. E.*, A, xii, 405] calcium cyanide applied under tents to four-year old trees at the rate of a quarter of a pound and left for four minutes caused scorching of the tender foliage. Nicotine dusts are safer from this point of view, and are also less destructive to the natural enemies.

Snodgrass (R. E.). U.S. Bur. Ent. **Anatomy and Metamorphosis of the Apple Maggot** *Rhagoletis pomonella*, **Walsh.**—*Jl. Agric. Res.*, xxviii, no. 1, pp. 1–36, 6 pls., 8 figs. Washington, D.C., 5th April 1924.

The contents of this paper are indicated by its title.

Wilson (H. F.) & Fluke (C. L.). **Choose Sprays carefully.**—*Wisconsin Agric. Expt. Sta.*, Bull. 366, 12 pp., 3 figs. Madison, Wis., June 1924.

The methods of insect destruction dealt with include preventive measures, insecticides, both liquid and dust, of which the preparation and preservation is discussed, fumigation, mechanical destruction and biological control. The properties necessary in a successful insecticide are explained.

Report on Commercial Insecticides and Fungicides.—*Connecticut Agric. Expt. Station*, Bull. 258, pp. 361–377. New Haven, Conn., June 1924.

The conditions for the sale of insecticides in Connecticut in accordance with the State Insecticide Act are defined; and a report is given on the results of inspection and analysis of various insecticides.

Quarantine on account of Japanese Beetle. Notice of Quarantine no. 48, with Regulations (3rd Revision). Revised Rules and Regulations supplemental to Notice of Quarantine no. 48 (3rd Revision).—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 11 pp., 1 map. Washington, D.C., 9th April 1924.

The previous Revision of Quarantine no. 48, with the supplemental Rules and Regulations [*R. A. E.*, A, xi, 426; xii, 117], are superseded by this 3rd Revision, effective as from 9th April 1924. The State of Delaware is added to those of Pennsylvania and New Jersey quarantined on account of the Japanese beetle [*Popillia japonica*, Newm.], and various changes are made in the details of the regulations.

Quarantine against Canadian Christmas Trees and Greens. Notice of Quarantine no. 57, with Regulations.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 30th June 1924.

The importation of Christmas trees and decorative plants from certain districts in the Province of Quebec into the United States is prohibited on and after 1st July 1924, without a permit from the Secretary of Agriculture, which is issued only on satisfactory evidence that the plants in question are absolutely free from any stage of the gipsy moth, *Porthetria dispar*, L.

Jacobsen (W. C.). **Bureau of Plant Quarantine and Pest Control.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 7–12, pp. 332–334. Sacramento, Cal., July-December 1923. [Received 22nd August 1924.]

The importance and scope of the work of the Bureau of Plant Quarantine and Pest Control is briefly reviewed, the detailed reports of the work of the various departments being given in the following papers.

Smith (H. S.). **Biological Control Work.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 7–12, pp. 334–342. Sacramento, Cal., July–December 1923. [Received 22nd August 1924.]

A list is given of the various parasites introduced into California from foreign countries and of those liberated in the field during 1923. *Comperiella bifasciata*, How., introduced from Japan, gave evidence of being a very desirable parasite of *Chrysomphalus aurantii* and *C. aonidum*; results, however, have been very disappointing, only a few adults emerging from *C. aonidum* and one male from *C. aurantii*. Though several colonies of *Lecanobius cockerelli*, Ashm., feeding on the eggs of the black scale [*Saissetia oleae*] have been placed at widely separated points in the field, no recoveries have been made. These conditions are probably the result of the activities of *Aphycus lounsburyi*, How., which during the past season made it almost impossible to find a suitable place to establish any parasite attacking immature stages of *S. oleae*. Attempts have been made to introduce *Coccophagus ochraceus*, How., from South Africa for the control of the early stages of *S. oleae*. This parasite has recently been found in the San Francisco Bay region and is apparently identical with specimens described from that area in 1887 by L. O. Howard. It is not, however, of widespread distribution and does not appear to be easily propagated in large numbers in the laboratory, most of the liberations being made from field collections. Other beneficial insects discussed are *Scymnus binaevatus*, Muls., and *Aphycus lounsburyi* [*cf. R. A. E.*, A, xii, 81, 82].

Strong (L. A.) & Fleury (A. C.). **Plant Quarantine.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 7–12, pp. 343–346. Sacramento, Cal., July-December 1923. [Received 22nd August 1924.]

The work of the inspection service for 1923 is outlined, showing an increase of nearly 100 per cent. in the amount of horticultural material inspected at the maritime ports as compared with 1922. One of the most important developments during the year was the establishment of a direct passenger line between San Pedro and Hawaii, this greatly increasing the danger of the introduction of the Mediterranean fruit-fly [*Ceratitis capitata*, Wied.] and the melon fly [*Dacus cucurbitae*, Coq.] into California. Particulars are given of the new inspection stations that have been opened, and the new quarantine orders and amendments are reviewed.

Mackie (D. B.). **Vacuum Fumigation.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 7–12, pp. 354–359. Sacramento, Cal., July-December 1923. [Received 22nd August 1924.]

In view of the efficient fumigation plant and service, various embargos against California-grown stock have been removed.

The work has included the fumigation of French pear stocks infested with *Eriosoma lanuginosum*, Hart. (pear root aphis), some 65,000 seedlings having been treated by vacuum fumigation with carbon bisulphide at the rate of 2 lb. per 100 cu. ft. in the fumigator. Apparently pear on French root has, when dormant, a high degree of resistance to the gas and can stand heavy doses without injury. A special apparatus has been installed for the fumigation of bulbs and the application of the

hot water treatment. Dormant bulbs are also apparently very resistant to fumigation. In commercial practice the treatment involves a dose of 2½ lb. carbon bisulphide per 100 cu. ft. in the fumigator, the fumigant being injected at a 29½ in. merc. vac., with an exposure of 90 minutes.

The precautions necessary to minimise damage from fumigation are described. All stock should be dug and balled when it is dormant. The balled stock should be defoliated and allowed to harden at least ten days before fumigation. It must not be watered for several days before treatment; the drier the earth the better, so long as the foliage is not wilting. Great care must be taken not to break the earth balls or the stock at a bud union. After removing stock from the fumigator, it should be well watered and protected from direct sunlight for at least three days.

All stages of the potato tuber moth [*Phthorimaea operculella*, Zell.] can be killed in mature potatoes by fumigation with carbon bisulphide at the rate of 2½ lb. per 100 cu. ft. injected at a 27 in. merc. vac. This treatment cannot be applied to new, immature potatoes, as the fumigation causes scorching.

URBAHNS (T. D.). **Insect Pest Control.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 7–12, pp. 359–363. Sacramento, Cal., July-December 1923. [Received 22nd August 1924.]

The eradication campaign against *Otiorrhynchus rugifrons* (strawberry root weevil) has been continued for two years; no weevils have been taken from the area formerly infested nor has any fresh infestation been found.

Various insects are recorded as new to California, including *Hypera variabilis* (*Phytonomus posticus*) (alfalfa weevil), occurring just within the California boundary, having spread from Nevada; *Otiorrhynchus* (*Brachyrhinus*) *ovatus* (strawberry root weevil), occurring over a small area; *Forficula auricularia* (European earwig), reported from many residential districts, the distribution being too scattered to warrant eradication; and *Anthonomus eugenii* (pepper weevil), which appears to have become thoroughly established.

Anarsia lineatella (peach twig moth) continues to be a serious pest, particularly of the late variety of peaches; it may be kept under control by delayed dormant spraying with lime-sulphur. Early and thorough application of remedial measures are essential for combating *Tetranychus telarius* (red spider), which is one of the most serious orchard pests. *Cydia* (*Carpocapsa*) *pomonella* was particularly abundant, necessitating a thorough systematic campaign. Efforts are being made to reduce the infestations by *Dialeurodes citri* (citrus whitefly) as far as possible until such time as complete eradication of the pest may be considered feasible. A dormant lime-sulphur spray applied when the buds are swelling or even opening is recommended against *Eriophyes pyri* (pear leaf blister mite); a second spray, consisting of one third the winter strength, should be applied in the cluster bud stage, and just before the blossoms open. *Trialeurodes vittatus* (grape whitefly) occurred in numbers, the eggs and nymphs being mostly found on the lower surface of the leaves. *Oecanthus niveus* (snowy tree-cricket) is more abundant throughout the State, and there is every possibility of its becoming a serious orchard pest. *Saissetia oleae* (black scale) is also becoming more numerous, causing serious

losses in the olive-growing districts ; all the young stages can be killed by winter spraying with a good grade of heavy miscible oil. The minimum strength recommended should be used to avoid injury to the foliage.

Nougaret (R. L.). **Viticulture Service.**—*Mthly. Bull. Cal. Dept. Agric.*, xii, no. 7–12, pp. 366–369. Sacramento, Cal., July-December 1923. [Received 22nd August 1924.]

The presence of the grape phylloxera [*Phylloxera vastatrix*, Planch.] is recorded from a previously suspected area, and it is proposed that another survey be made next spring to determine the extent of the infestation. The situation with regard to the grape mealybug [*Pseudococcus bakeri*, Essig] and the root-knot Nematode [*Heterodera radicicola*, Greef] is much the same as in previous years.

Discussions on Plant Quarantine.—*Mthly. Bull. Cal. Dept. Agric.*, xiii, no. 1–6, pp. 54–67. Sacramento, Cal., June 1924.

At the fifty-sixth Convention of Fruit Growers and Farmers, at Santa Ana, California, in 1923, L. A. Strong read a paper on " Recent Plant Quarantine Development, Federal and State," in which he pointed out the value of quarantine measures and emphasized the importance of their judicious application. C. S. Teague, in a paper entitled " Our Interest in Plant Quarantine," gave statistics on the total value of crops in California and the losses due to insect and other depredations, which might be greatly reduced by adequate appropriations for quarantine purposes. The method of inspection was described by C. P. Hancock in a paper entitled " Discussion of Plant Quarantine," and the contents of G. M. List's paper are indicated by its title, " Interest of the West in Plant Quarantine."

Smith (L. B.). **The Japanese Beetle** (*Popillia japonica*, **Newm.**).—*Mthly. Bull. Cal. Dept. Agric.*, xiii, no. 1–6, pp. 67–72. Sacramento, Cal., June 1924.

An account is given of the bionomics and economic importance of *Popillia japonica*, Newm. (Japanese beetle). The remedial measures discussed have already been noticed [*R. A. E.*, A, xii, 175].

Hartzell (A.). **The Genus *Empoasca* in North America.**—*Proc. Iowa Acad. Sci.*, xxx, pp. 87–133, 4 pls., 5 figs. [Des Moines] 1923. [Received 27th August 1924.]

In recent investigations on *Empoasca mali*, LeB., great difficulty was experienced in separating closely related species of this genus, which had been confused by former investigators, and a systematic revision of the genus was undertaken. Among the species dealt with, four new ones are described.

A detailed account is given of the life-history of *E. unicolor*, Gill., and a summary of the author's work on *E. mali*, LeB. [*R. A. E.*, A, xii, 40]. The injury caused by *E. unicolor* to apple foliage, together with that of *Typhlocyba rosae*, L., has generally been attributed to *E. mali*, causing considerable confusion in the literature. *E. unicolor* is generally distributed throughout southern Canada and the eastern

United States, being most abundant in New England, and the middle Atlantic and north central States. The favoured food-plants are apparently apple and *Crataegus*, but it is also recorded from conifers in Maine. Both the nymphal and adult stages confine their attack to the lower surface of leaves, showing a preference for the older leaves of young trees, though the older trees may also be attacked. Of greatest economic importance is the loss in value of the fruit as a result of spotting. Egg punctures may occur in sufficient numbers to allow the establishment of injurious fungi in the twigs; it is also possible that this species may be responsible for the transmission of fire blight (*Bacillus amylovorus*). There is one generation a year, the first eggs being found at the beginning of September, and about 7–8 months are passed in this stage. They hatch about the middle of May and by the first week in July all the nymphs have reached maturity.

E. birdi, Goding, has been reported on apple, hop, walnut and bean, and *E. tumida*, Gill., and *E. alboneura*, Gill., on plum (both probably accidentally), in the United States, but their economic status is uncertain. The remaining species of the genus do not appear to be of economic importance.

Mitchener (A. V.). **Control of Grasshoppers.**—*Manitoba Farmers' Library*, Extens. Bull. 75, 7 pp., 6 figs. Winnipeg, May 1924.

The early spring measures against grasshoppers include burying the eggs by ploughing; in late spring and summer the burning of straw in fields where the insects are resting is advocated. The poison-baits recommended and suitable machinery for mixing them are explained [*R. A. E.*, A, ix, 259]. A new bait, which is less expensive than the bran formula, consists of 100 lb. finely cut green autumn rye or wheat plants, with 5 lb. white arsenic or Paris green, 5 lb. common salt, and water to moisten. In autumn, the ploughing should be repeated as in early spring. Among natural enemies in Manitoba, Franklin's gull is very helpful in clearing infested fields.

Paoli (G.). **Rincote dannoso alla vite.** [A Bug injurious to the Vine.] —*Boll. Soc. ent. ital.*, lvi, no. 7, pp. 110–112. Genoa, 15th July 1924.

The Capsid believed to be responsible for the "rissetta" curl of grape vines in Liguria [*R. A. E.*, A, xi, 400] has been found to be *Lygus spinolae*, Mey. Prolonged observation has shown it to be the chief if not the sole cause of the trouble, the other Capsid present, *Calocoris norvegicus*, Gmel., being of less importance. Both are nocturnal in habit and attack the vine when the buds are opening, *i.e.*, only in May. Early in June they become adult and are less numerous on the vine.

Silvestri (F.). **La formica argentina.** [The Argentine Ant.]—*Riv. Agric.*, xxix, nos. 29–30, pp. 453–454, 467–468. Rome, 18th–25th July 1924.

In view of the spread in Italy of the Argentine ant, *Iridomyrmex humilis*, Mayr, a brief description is given of its habits and of measures for combating it.

MALENOTTI (E.). **Novità sullo Zabro gobbo.** [News about *Zabrus tenebrioides*.]—*Il Coltivatore*, nos. 20 & 22. Reprint, 7 pp. Casale Monferrato, 20th July & 10th August 1924.

Though captive individuals of *Zabrus tenebrioides*, Goez., make repeated attempts to fly, they have never been observed to succeed. This accounts for the fact that infestations, though severe, are limited to small areas.

A trench 12 inches deep with a vertical side opposite the infested field has been found effective for capturing large numbers of this beetle. Though it is able to climb the vertical earthen surface, it chooses the apparently easier route afforded by cross trenches leading to sunken trap-pots.

DE LA ESCALERA (M.). **Nota sobre dos Coleopteros que atacan á la *Lymantria dispar* y al *Tortrix viridana* en el Escorial.**—*Bol. R. Soc. esp. Hist. nat.*, xxiv, no. 5, pp. 273–274. Madrid, May 1924.

In the Escurial, where the oaks are badly infested by *Porthetria* (*Lymantria*) *dispar* and Tortricids, the Silphid, *Xylodrepa quadripunctata* has become very numerous among the leaves attacked by the larvae of *Tortrix viridana* and those of *P. dispar*, on both of which it is predacious.

As efforts are being made to introduce from the United States *Schedius* [*kuvanae*, How.], a parasite of *P. dispar* [*R. A. E.*, A, xi, 578], it is suggested that it might be easier to disseminate *X. quadripunctata* among infested oaks. The Carabid beetle, *Calosoma inquisitor*, is frequently associated with this species.

ADKIN (R.). **Apple Fruit attacked by the Larva of *Tortrix heparana*.**—*Entomologist*, lvii, no. 735, pp. 188–189. London, August 1924.

Tortrix heparana was observed feeding on the fruit of apple in Sussex. When about a third of the apple was consumed, pupation occurred in the space between the fruit and an attached leaf. During the whole period of feeding and pupation, the depredations were completely hidden from view. This moth has apparently so far only been recorded as attacking the leaves and possibly the flowers of apple.

FEYTAUD (J.). **Les Insectes de l'Arachide.**—*Rev. Zool. agric. & appl.*, xxiii, no. 4, pp. 85–92, 2 figs. Bordeaux, April 1924.

In Bordeaux, where some 80,000 tons of ground-nut oil are extracted annually from *Arachis* nuts grown in West Africa, considerable damage is done by insects among the stored nuts. The species found include *Tenebroides mauritanicus*, L., *Silvanus surinamensis*, L., *Tribolium castaneum*, Hbst. (*ferrugineum*, F.), a species of *Alphitobius*, probably *A. piceus*, Ol., and *Lepisma domestica*, Pack.

Roubaud's account of insects injuring ground-nuts in Senegal is discussed [*R. A. E.*, A, v, 338]. The Bruchid, *Pachymerus acaciae*, Gyll., is the only pest recorded by him that is able to pierce the shell of the nut, and this has not yet been found in France, so that the damage done by the other species can only be secondary. Termites, although not in themselves very injurious, as they merely pierce the nut to extract water when it is lacking in the ground, are responsible for encouraging many of the other pests, which attack the kernels through

the holes they have made. The remedies suggested are fumigation by burning sulphur or by the Clayton apparatus, using about ½ oz. per 35 cu. ft. for 24 hours. Chloropicrin might also be tried. The use of heat is largely practised in America, but requires a special installation. Some such process should be systematically and regularly practised in all depots where the nuts remain for any time, both in the Colonial ports and in France.

FEYTAUD (J.). **Le question doryphorique au début de la campagne 1924.**—*Rev. Zool. agric. & appl.*, xxiii, no. 5, pp. 109–116, 1 fig. Bordeaux, May 1924.

The local distribution of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in France during 1922 is discussed, and its spread during 1923 is shown on a map. The greatest spread is always found to occur during June and July, in consequence of the spring flights of April and May. As the limit of infestation is already about 87 miles from the original point of introduction, it is obvious that there is great danger of the insect eventually reaching the large potato-growing regions of France, and the importance of every grower following such simple methods as collecting large larvae and adults, destroying the young larvae by fire or by the use of insecticides, and disinfecting the soil with sulphur is pointed out. The fields should be constantly watched for some months even after the successful use of these remedies.

DIEUZEIDE (R.) & TEMPÈRE (G.). **Sur quelques Insectes des entrepôts.**—*Rev. Zool. agric. & appl.*, xxiii, no. 5, pp. 116–119. Bordeaux, May 1924.

A collection of Coleoptera taken from cereals imported from various places and stored in Bordeaux during the War were found to include the Tenebrionids, *Alphitobius piceus*, Oliv., occurring in enormous numbers; *A. ovatus*, Hbst.; *Tribolium castaneum*, Hbst. (*ferrugineum*, F.); *Palorus* (*Caenocorse*) *depressus*, F.; and *Alphitophagus bifasciatus*, Say. In lesser numbers were the Trogositid, *Tenebroides mauritanicus*, L., the Histerid, *Carcinops pumilio*, Erich., and the Carabid, *Laemostenus terricola*, Hbst., the two last being largely carnivorous and possibly predacious on the larvae of the others, and the Curculionids, *Calandra oryzae*, L., and *C. granaria*, L. The opinions of various authors regarding the rôle played by these pests are discussed, but it is certain that most, if not all, of them are granivorous, or at least omnivorous and feed on the grain itself as well as on the fungi or the living and dead insects found amongst it.

VOUKASSOVITCH (P.). **Sur la biologie du** *Dibrachys affinis*, **Masi, parasite de l'Eudémis.**—*Rev. Zool. agric. & appl.*, xxiii, nos. 4 & 5, pp. 92–98 & 119–131. Bordeaux, April & May 1924.

A study was made during 1921–23 of the parasites of the larval and pupal stages of the vine moth [*Polychrosis botrana*, Schiff.] occurring in the south of France, especial attention being paid to the Chalcid, *Dibrachys affinis*, Masi. Silvestri's description of this insect is quoted, with additions by the author. The hibernating pupae of *P. botrana* seemed to be always the stage chosen for attack, and the

rearing technique employed by the author is described. Emergence of the adults generally occurs in April, shortly before the host begins to fly, the males appearing first and pairing with the females immediately upon their emergence. Males seem to live on an average 23 days and females about 37 days. The length of life is influenced by temperature, humidity, etc., moisture being less favourable than drought. Oviposition occurs one or two days after fertilisation, the process being described. The same pupa may be used for oviposition several times by the same female or by different individuals, a number of eggs being deposited each time, but only those parasites originating from the last oviposition seem to emerge successfully. The pupae appear to be paralysed or even killed at the beginning of the act of oviposition. The eggs hatch in a few days, and the young larvae feed voraciously during late autumn and spend the winter within the host, slowly assimilating the nourishment they have absorbed. With the approach of warm weather the transformation into pupae begins, this being greatly influenced by temperature.

These parasites have also been successfully reared on pupae of the vine Pyralid [*Sparganothis pilleriana*, Schiff.], *Sitotroga cerealella*, Ol., *Hyponomeuta* sp. found on *Salix*, *Calliphora vomitoria*, L., *C. erythrocephala*, Meig., and a sawfly, and on larvae of *S. cerealella*. *P. botrana*, however, was most successful for rearing purposes. Certain hosts serve *D. affinis* not only for oviposition purposes but also for nutrition, the food being withdrawn in the same manner as with other Chalcids that construct a tube through which to extract the juices, though in this case the tube is a very short one. The rôle of *D. affinis* with regard to other parasites that are already within the host is not known. They must be killed, and *D. affinis* may act as a hyperparasite, but the author has never observed pupae parasitised by Ichneumonids giving rise to adults of *D. affinis*.

Paillot (A.). **Sur l'étiologie et l'épidémiologie de la grasserie du Ver à soie.**—*C. R. hebdom. Acad. Sci.*, clxxix, no. 3, pp. 229–231. Paris, 1924.

The disease known as " grasserie " has this year been the cause of greater loss to the silkworm industry than that of " flacherie." It is a contagious disease and may be transmitted by the intestinal tract. Its development is relatively slow, and depends in large measure on temperature. At 18°C. [64·4°F.], or lower, the characteristic symptoms of the disease are very slow to develop, or may even not mature at all, but at 28–30°C. [82·4–86°F.] the external symptoms may appear as early as the fourth day after inoculation. The blood is contagious even before the appearance of polyhedral bodies in it. The disease attacks all stages of the insect, and may be transmitted from one generation to another by means of the egg.

Larvae that show signs of the disease should be at once destroyed, and all eggs used should have been obtained from healthy insects.

Arnaud (—). **Expériences de destruction des vers blancs.**—*Vie agric. & rur.*, xxv, no. 33, pp. 101–102. Paris, 16th August 1924.

In experiments conducted by the bacteriological laboratory of Rheims during 1922 on various entomophagous fungi, the best results were obtained with *Verticillium heterocladum*, though none of them was very satisfactory. A species of *Cetonia* [*C. aurata*] was used.

Though the experiments with chloropicrin against Melolonthids cannot be considered conclusive, they indicate its value for the destruction of the larvae and eggs of these beetles.

MARTINET (G.). **Oscinies et myiase des céréales.**— *Ann. agric. Suisse*, xxv, no. 3, pp. 287–297, 7 figs. Bern, 1924.

Oscinella pusilla and *O. frit* both cause considerable damage to cereal crops in Switzerland, oats being the most severely attacked. The best precautions against these flies are the sowing of native varieties of oats, which are much less susceptible to attack than imported ones, and sowing early in the spring and not later than mid-September in the autumn. Early maturing varieties are less liable to attack, and only uniformly good seed should be used, in order to produce regular and rapid germination. Sowing should be done in lines by machine, and the fields should be kept as free as possible from all shelter for the pest. Trap crops have given good results, barley being the most successful; this should be sown during August on small areas bordering the fields to be autumn-sown. The trap-crop is ploughed in early in autumn. The degree of resistance of different varieties of oats and the dates of formation of the ears are shown in tabular form.

FAES (H.), STAEHELIN (M.) & BRÜDERLEIN (J.). **La lutte contre nos phalènes hiémales.**— *Ann. agric. Suisse*, xxv, no. 3, pp. 299–314, 8 figs. Bern, 1924.

The winter moths occurring in orchards in Switzerland are chiefly *Cheimatobia brumata*, L., and *Hybernia defoliaria*, L., both of which are on the wing and ovipositing from early October to mid-December, and *Anisopteryx aescularia*, Schiff., which flies in March. An account is given of each of these. During the last few years, when the detailed observations recorded were made, *H. defoliaria* occurred very rarely, and *C. brumata* was always by far the most abundant and destructive of the three. In normal years, in Switzerland, France and Germany, this moth begins to appear towards mid-October, and is at its maximum in early November, dying down in mid-December. The appearance of these winter moths is generally somewhat early in high altitudes and northern countries, while in warmer climates emergence is delayed. Seasonal variations also have a considerable influence; after the exceptionally warm summer of 1921, emergence was much delayed, and occurred from mid-November to mid-December in the Lausanne region.

Experiments with sticky bands were made during 1921–1923, and a number of proprietary materials are recommended in this connection. Bands to catch *H. defoliaria* should be placed in position in late September or early October; those for *C. brumata* by the 15th October, and those for *A. aescularia* at the end of February or beginning of March. The bands used in autumn should be removed and immediately burnt, not later than the end of February, and all eggs laid on the trunk between the band and the ground should be destroyed by scraping the bark, or, better still, by spraying with a 5 per cent. solution of soluble carbolineum or a 20 per cent. solution of liquid lime-sulphur. Arsenical sprays are very effective against the larvae.

S[CHENK] (P. J.). **De beukenwolluis.** [The Beech Scale.]—*Floralia*, xlv, no. 32, p. 508, 1 fig. Assen, 8th August 1924.

Most of the information in this article on the beech scale, *Cryptococcus fagi*, is taken from a paper already noticed [*R. A. E.*, A, ii, 571]. The treatment recommended is scrubbing the trunk and branches in winter with a 7½ per cent. solution of carbolineum. Spraying is less effective, as the felted wax covering protects the insect.

KRAUSSE (A.). **Einige Notizen über den grossen braunen Rüsselkäfer (*Hylobius abietis* L.).** [A few Notes on the large brown Weevil (*H. abietis*, L.).]—*Internat. Ent. Zeitschr.*, xviii, no. 16, pp. 97–98. Guben, 1st August 1924.

Experiments are described in which pieces of pine root and branches were buried at a depth of 1½ to 2 inches under dry sand. Though the weevils, *Hylobius abietis*, had been starved for several days, they did not penetrate the sand, but as soon as it was moistened they burrowed through to the twigs and fed on them. Similar results were obtained with damp garden soil. These facts may explain divergencies of opinion regarding the value of earthing up as a protection to plants.

BODENHEIMER (F.). **Beiträge zur Kenntnis der Kohlschnake (*Tipula oleracea*, L.). Zur Anatomie und Oekologie der Imago.** [Contributions to the Knowledge of *T. oleracea*. The Anatomy and Ecology of the Adult.]—*Zeitschr. wiss. Zool.*, cxxi, pp. 393–441, 25 figs. Leipzig, 1924.

The title of this paper indicates its contents. The anatomy of the imago is described at length. Most of the ecological data are taken from sources indicated. The author finds that wind is a most important climatic factor for the adult, which invariably seeks sheltered situations on account of its helplessness in wind.

BODENHEIMER (F.). **Beiträge zur Kenntnis der Kohlschnake (*Tipula oleracea*, L.).** [Contributions to the Knowledge of *T. oleracea*.]—*Arch. Naturgeschichte*, xc, Abt. A, no. 2, pp. 61–108, 20 figs. Berlin, May 1924. [Received 13th August 1924.]

The classification, synonymy, distribution and anatomy of the adult of *Tipula oleracea*, L., are dealt with in this paper. Notes on the egg and pupa are also given.

BODENHEIMER (F.). **Beiträge zur Kenntnis von *Tipula oleracea*, L. Zur Kenntnis der Larve.** [Contributions to the Knowledge of the Larva of *T. oleracea*.]—*Zool. Jahrb.*, Abt. System., no. 1–2, pp. 129–154, 13 figs. Jena, 1924.

The larvae of *Tipula oleracea*, L., hatch about 14 days after the eggs are laid. Towards the end of the winter they are to be found in the fields in various stages of growth, the normal length of larval existence being 9–10 months.

The morphology of the larvae is described in detail.

Mokrý (T.). **Z mých skušenostío bekyni sosnové.** [From my Experiences of the Nun Moth.]—80 pp. Published by the author, Písek (Bohemia), 1923. (Abstract in *Centralbl. Bakt. Paras, Infekt.*, IIte Abt., lxii, no. 7–12, p. 215. Jena, 15th August 1924.)

The increase of the nun moth [*Liparis monacha*] in Central Europe during the past 10 years is attributed to climatic conditions [*R. A. E.*, A, x, 441], and not to the practice of planting spruce in pure stands. The outbreak of polyhedral disease is partly due to lack of food after the caterpillars have defoliated the trees. While ants are valuable as auxiliaries, they also destroy Tachinids and the larvae and pupae of other insects.

Ružička (J.). **Ueber den Einfluss der Niederschläge auf die Vermehrung und den Frass der Nonne.** [On the Influence of Rainfall on the Increase and Attack of the Nun Moth.]—*Wein. allg. Forst.- u. Jagdztg.*, xli, pp. 98–99. Vienna, 1923. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, IIte Abt. lxii, no. 7–12, pp. 215–216. Jena, 15th August 1924.)

Tabulated data from Bohemia show that the nun moth [*Liparis monacha*] slowly increases with slight rainfall and that it decreases with heavy rains. In 3 separate cases it was found that a dry spring provided the first stimulus to an increase ; that in a second dry spring (2–4 years after the first) an outbreak and defoliation occurred ; and that after 5 years (after the first dry spring) the outbreak was extinguished.

Loos (K.). **Versuche und Untersuchungen über Gewichte, Maasse, Vertilgungsmittel an Nonneneiern und sonstige Beobachtungen.** [Experiments and Investigations on the Weights, Measurements, and Substances for the Destruction, of the Eggs of the Nun Moth, and other Observations.]—*Centralbl. f. d. ges. Forstwes.*, xlviii, pp. 110–135, 1922. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, IIte Abt., lxii, no. 7–12, p. 216. Jena, 15th August 1924.)

Among the results recorded are the following : A 10 per cent. solution of Kainit is the best practical spray for destroying the eggs of the nun moth [*Liparis monacha*] ; the best method of spraying remains to be worked out.

From 65 to 85 per cent. of the eggs are laid on the lower parts of the tree-trunks—especially in the case of spruce—and the eggs remain there for 8½ months under forest conditions. The caterpillars that feed on larch needles yield vigorous moths that produce the best developed eggs. Examination has proved that the jay (*Garrulus glandarius*) can devour 20,000 eggs a day, though many individuals did not contain a single egg, being probably birds from the North, where this source of food is lacking.

Ružička (J.). **Zur Nonnenbekämpfung.** [Nun Moth Control.]—*Wien. allgem. Forst.- u. Jagdztg.*, xli, p. 88. Vienna, 1923. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, IIte Abt., lxii, no. 7–12, pp. 216–217. Jena, 15th August 1924.)

The adults of the nun moth [*Liparis monacha*] are driven out of the stands by wind, and such caterpillars as are infested with the polyhedral disease are killed by sunlight. In view of these facts the author

advises cutting in alternate strips so that a stand may be divided by 30-foot-wide cuts into 90-foot-wide strips. The cuts may run from north to south or from east to west. From the centre of infestation a wind passage should be cleared (in the line of the prevalent wind) to the nearest water or to an open field. Caterpillars infected with polyhedral disease cannot resist water vapour or air other than forest air. Polyhedral disease should be disseminated at the focus of infestation.

Teichmann (A.). **Kulissenhiebe und die Nonne.** [Cutting in alternate Strips and the Nun Moth.]—*Wien. allgem. Forst.- u. Jagdztg.*, xli, p. 136. Vienna, 1923. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, IIte Abt., lxii, no. 7–12, pp. 216–217. Jena, 15th August 1924.)

Attention is called to the fact that the practice of cutting in alternate strips, recommended above, breaks up hitherto compact stands of trees and renders them liable to very severe damage from storms.

Eckstein (—). **Der Buchenspringrüsselkäfer** *Orchestes fagi* **und seine wirtschaftliche Bedeutung.** [The Beech Weevil, *O. fagi*, and its economic Importance.]—*Dtsch. Forstztg.*, xxxvii, pp. 435–437. 1922. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, IIte Abt., lxii, no. 7–12, pp. 217–218. Jena, 15th August 1924.)

The beech weevil, *Rhynchaenus* (*Orchestes*) *fagi*, leaves its winter quarters in cracks in the ground or bark when the beech tree is unfolding its leaves, in order to feed on the latter. The female deposits her eggs singly on the midribs ; if more than one egg is laid on a midrib, only one larva develops. The larva mines the leaf, attains full growth in 3 weeks and pupates in a cocoon at the edge of the leaf. The pupa is found in the cocoon early in June. The adult emerges in 10–14 days, and feeds on the leaf stems and blades, causing the leaves to fall. There is one generation a year.

Blattný (C.). **Několik slov a merách (Psyllidae), škodlivých ovocným stromům.** [A few Words on Psyllids injurious to Fruit Trees.]—*Ochrana Rostlin*, iv, no. 4, pp. 51–52, 5 figs. Prague, July 1924.

Considerable injury may be caused to apples in Czecho-Slovakia by *Psylla mali*, Schmidb., and to pears by *P. pyrisuga*, Först., and *P. pyri*, L. Brief notes are given on the local habits of these Psyllids, spraying with various substances, such as tobacco extract or carbolineum, being recommended for their control.

Nejdůležitější choroby a škůdcové kulturních rostlin v Cechách r. 1923. [The most important Pests of cultivated Plants in Czecho-Slovakia during 1923.]—*Ochrana Rostlin*, iv, nos. 2–3 and 4, pp. 44–45 & 52–56. Prague, May & July 1924.

This list of pests includes many noxious insects recorded under the crops attacked, with brief notes on the damage done.

Farský (O.) & Rašek (J.). **Choroby a škůdcové ovocného stromoví, zeleniny a lesa, hlášení fytopathologické sekci mor. zem. výzk. ústavu zemědělského v Brně.** [Plant Pests and Diseases recorded by the Phytopathological Section of the Agricultural Experiment Station at Brünn.]—*Ochrana Rostlin*, iv, no. 4, pp. 60–62. Prague, July 1924.

A brief account is given of the pests, including noxious insects, attacking various crops in Moravia.

[Pospelov (V.).] **Поспелов (В.). Успехи прикладной Энтомологии в Соединенных Штатах Северной Америки.** [Progress of Applied Entomology in the United States of North America.]—**Сельское и Лесное Хозяйство.** [*Agric. & Forest Economy*], no. 13, separate, 22 pp., 10 figs. Moscow, 1924.

A general account is given of the present status of economic entomology in the United States of America, including a review of recent advances in the study of the more important insect pests and their control.

[Bogdanov-Katkov (N. N.).] **Вогданов-Катьков (Н. Н.). Русская Литература по Прикладной Энтомологии.** [Russian Literature on Applied Entomology.]—224 pp. **Государств. Издательство** [Govt. Publs.], Leningrad, 1924. Price 3 r. 75 kop.

This is the first part of what is intended to be as complete a bibliography as possible of the Russian literature on applied entomology, dating from 1767 to 1922. All signed articles are listed alphabetically under the author's name and unsigned ones under the first word of the title. The bulk of the publications are concerned with agricultural entomology, though some works on forest entomology, sericulture and apiculture are also included; these, however, will be dealt with more fully in a supplementary volume. The second volume, which will include a list of the scientific names of insects, indicating where any information concerning them may be found, is not expected to appear before 1928.

[Pospelov (V.).] **Поспелов (В.). Опыт опыления сухими инсектисидами для борьбы с саранчей.** [Experiments with dry Insecticides for the Control of Locusts.]—**Извест. Государств. Инст. опытн. Агрон.** [*Ann. State Inst. Exptl. Agron.*], ii, no. 3, pp. 92–93. Leningrad, 1924.

Dry insecticides would be particularly adapted to Russian conditions owing to the difficulty of obtaining water. Recent experiments for the control of locusts showed that finely powdered sodium arsenate applied to rye at the rate of one part by weight to 20 parts of chalk does not injure the plants. The locusts would only feed on the treated plants during the first 24 hours, after which symptoms of poisoning were evident. By the fifth day, 96 per cent. were dead, and none survived longer than the sixth day.

[Parfentev (I. A.).] **Парфентьев (И.В.). Новый бич хлопка–розовый червь в коробочках хлопчатника,** *Platyedra gossypiella* **Saund.** [New Pest of Cotton—Pink Boll Worm of Cotton, *P. gossypiella.*] —**Хлопковое Дело** [*Cotton Indust.*], iii, no. 5–6, pp. 73–94, 10 figs. Moscow, May–June 1924.

Up to the present there has been no record of *Platyedra gossypiella*, Saund. (pink boll worm of cotton) from Turkestan, but the importance of guarding against its introduction and the consequent need for legislation is pointed out. Its life-history as occurring in other countries and the various remedial measures recommended are reviewed.

[Yuferev (V.).] **Юферев (В.). Условия хлопковой кампании 1924 г. в Туркестане.** [The Conditions of the Cotton Season of 1924 in Turkestan.]—**Хлопковое Дело** [*Cotton Industry*], iii, no. 5–6, pp. 159–164. Moscow, 1924.

The infestation by locusts in 1924 proved to be greater than anticipated. The principal species was the Italian locust [*Calliptamus italicus*, L.]; the Moroccan locust [*Dociostaurus maroccanus*, Thunbg.] was present only in small numbers and was local, and the Asiatic locust [*Locusta migratoria*, L.], though swarming in the reed-beds, did no damage to crops. Special arrangements are being made to extend the activities of the Turkestan anti-locust organisation into Bokhara and Khorem (Khiva).

Statistics of Pink Boll Worm Occurrence from 1916 to 1922.—*Minist. Agric. Egypt., Tech. & Sci. Serv.*, Bull. 27, 19 pp. Cairo, 1923. [Received 15th August 1924.]

In a series of tables are shown the percentage of infestation by the pink bollworm [*Platyedra gossypiella*, Saund.] and by *Earias* [*insulana*] in green cotton bolls in Egypt during 1916–1922. The figures were obtained by collecting samples of green bolls each week from every province; these were cut into slices and examined for infestation, and the larvae found in them recorded. The inevitable margin of error to be allowed in these figures is discussed, as well as the fluctuations in different years, due to the earliness or lateness of the cotton, etc.

Bodenheimer (F. S.). **The Coccidae of Palestine. First Report on this Family.**—*Zionist Organisation Agric. Expt. Sta.*, Bull. 1, 100 pp., 12 pls., 45 figs. Tel-Aviv, Palestine, July 1924.

This work, which is the result of 18 months' study of the Coccidae of Palestine, includes sections dealing with the history of the subject as it was previously known, the distribution of the family in Palestine, with a discussion of conditions in that country, the gall-producing Coccids, the economic species, and the native names of the scales. A key to the sub-families and genera is given.

The species of economic importance include: on oranges, *Saissetia* (*Lecanium*) *oleae*, *Chrysomphalus aurantii*, *C. aonidum* (*ficus*), *Lepidosaphes pinnaeformis*, *L. gloveri*, *Pseudococcus citri* (the most dangerous species), *Parlatoria pergandei*, *P. oleae*, *Ceroplastes floridensis*, *Coccus* (*Lecanium*) *hesperidum* and *Icerya purchasi*; on *Olea*, *Aspidiotus hederae* and *A. britannicus*; on *Ficus*, *Ceroplastes rusci*, *Lepidosaphes ficus* (*conchiformis*) and *L. minima*; and on *Pyrus*, *Parlatoria oleae* and *Ceroplastes floridensis*. *Pseudococcus vitis* is found in great numbers on the roots of *Vitis* in Judaea. *Pseudococcus sacchari* is a potentially

dangerous pest on *Saccharum*. *Diaspis* (*Aulacaspis*) *pentagona* has recently been found on wild *Rubus*.

Forest trees are injured by *Leucaspis pini* (*candida*) and *L. pusilla* on *Pinus*, *Chionaspis striata* on *Cupressus* and *Thuja*, *Epidiaspis gennadii* on *Pistacia*, *Asterolecanium variolosum* on *Quercus*, *Eriococcus araucariae* on *Araucaria*, and *Aspidiotus hederae* on *Ceratonia siliqua*, *Melia azedarach* and *Nerium oleander*, all of which are associated with sooty mould. Ornamental and indoor plants are attacked by *A. hederae*, *C. hesperidum*, *Saissetia* (*Lecanium*) *hemisphaerica*, *P. citri* and *I. purchasi*.

Natural enemies of these Coccids in Palestine are the Coccinellids, *Chilocorus bipustulatus*, L., *Coccinella septempunctata*, L., *Exochomus auritus*, Scriba, *Halyzia duodecimguttata*, Poda, *Novius cardinalis*, Muls. (imported), *N. cruentatus*, Muls., and *Scymnus quadrivulneratus*, Muls.; the Lepidopterous larva, *Thalpochares scitula*, Rbr., which attacks *S. oleae* and *Lecanium racheli*; and certain Hymenopterous parasites that require to be studied.

The best remedy for Coccid infestation in plantations is fumigation with hydrocyanic-acid under portable tents; but this method is expensive and has not proved profitable in Palestine. It should, however, be used for the purpose of keeping *Chrysomphalus aonidum* out of the large orange-growing centres of Samaria and Judaea. In other cases, lime-sulphur solution is recommended. From February to mid-April is the best time for using this spray, and the treatment should be repeated a second year. Tobacco-soap solution or nicotine extract are also recommended. In nurseries of young trees or indoor ornamental plants any of these liquids can be applied with a brush. The preparation of all these remedies is described; they are always most efficacious against the young larvae. As the control of *Pseudococcus sacchari* in sugar-cane plantations will be an important problem of the future, the preparation of paraffin emulsion, into which young slips should be dipped for 2 minutes before planting, is described. The biological control of Coccids adopted in other countries is discussed, and it is suggested that a place for rearing the parasites of *P. citri* should be established in Palestine.

A list of the species occurring in Palestine is given, with a short description of each, enumeration of the food-plants, and an account of the geographical distribution, particularly of the economic species. An alphabetical list of the food-plants is also given, with the species attacking each.

The new species described are *Aspidiotus aharonii*, on *Ceratonia siliqua*; *A. herzlianus*, on *Asparagus aphyllus*; *Chionaspis engeddensis*, on *Tamarix* sp.; *Lepidosaphes palaestinensis*, on olive (*Olea europaea*); *L.* (*Coccomytilus*) *zlocistii*, on peach (*Persica vulgaris*); *Parlatoria judaica*, on apricot (*Prunus armeniaca*); *Lecanium* (*Eulecanium*) *racheli*, on *Vitex agnuscastus*; and *Pseudococcus lindingeri*, on *Panicum colonum*.

Bodenheimer (F. S.). **Papar hanamer. Nokew hagesaim shel aze-hazait wehatapuchim beerez jisrael** (*Zeuzera pyrina*, **L.**). [The Leopard Moth. A Borer in Olive and Apple Trees in Palestine.]—*Palestine Agric. Expt. Sta.*, Ent. Dept., Leaflet no. 1, 8 pp., 4 figs. Tel-Aviv, 1924.

The leopard moth, *Zeuzera pyrina*, L., is one of the most dangerous enemies of olive and apple trees in Palestine. It occurs all over the

country including Judaea, Galilee and Samaria. In Palestine development is completed in one year. The flight period lasts from June to October, and is at its height from the second half of July to the first half of September. The presence of the pest is easily recognised in the spring by the excrement of the larvae on the ground, and in the autumn by the empty pupal skins, which protrude from the holes. The trees are very severely damaged and after prolonged attack (3–5 years) even the more resistant trees suffer considerably. Native olive trees are decidedly more resistant than those introduced from France or Italy.

The remedial measures recommended are regular inspection, and the destruction of the larvae by inserting a wire into the holes followed by disinfection with benzene or naphthaline, finally closing the hole with grafting wax or loam.

Bodenheimer (F. S.). **Ash habegadim** (*Tineola biselliella*, **Humm.**). [The Clothes Moth.]—*Palestine Agric. Expt. Sta.*, Ent. Dept., Leaflet no. 3, 8 pp., 1 fig. Tel-Aviv, 1924.

The biology of *Tineola biselliella* and the use of Eulan against it [*R. A.E.*, A, ix, 611] are explained.

Bodenheimer (F. S.). **Rphuoth achadoth neged hamasikim bagan ubasadeh.** [Some Control Measures against Insect Pests in Field and Garden.]—*Palestine Agric. Expt. Sta.*, Ent. Dept., Leaflet no. 2, 4 pp., 5 figs. Tel-Aviv, 1924.

Instructions are given for the preparation and application of lime-sulphur solution against scale-insects and nicotine-soap solution against Aphids and *Pseudococcus*.

Cameron (G. S.). [*Earias insulana* **in Iraq.**]—*Mthly. Agric. Bull. Iraq*, 15th June to 15th July 1924, 1 p. Baghdad, 26th July 1924.

Earias insulana (spiny bollworm) has been found on *Hibiscus cannabinus*, *H. esculentus* and hollyhock, in gardens about 6–7 miles away from the nearest cotton-growing area.

Dover (C.). **The Collyrine Beetle Borer of Tea and Coffee in South India.**—*Planters' Chron.*, xix, no. 29, p. 473. Coimbatore, 19th July 1924.

Attention is called to the fact that the Cicindelid recorded as boring in coffee and tea in India [*R. A.E.*, A, v, 121, 164] is now identified as *Neocollyris crassicornis*, Dejean.

Sen (P. C.). **The Red Cotton Bug** (*Dysdercus cingulatus*, **Fab.**).—*Bengal Agric. Jl.*, iv, no. 2, pp. 45, 1 pl. Dacca, June 1924.

Brief biological notes are given on *Dysdercus cingulatus* infesting cotton, hand-picking being recommended for its control.

Malayan Agriculture, 1924. Handbook compiled by the Department of Agriculture, F.M.S. and S.S.—ii+301+iv pp., 10 pls. London, British Empire Exhibition, 1924. Price 1*s*.

In the chapter of this handbook devoted to plant diseases and pests, brief notes are given on the life-history and control of the insects

attacking the various crops, with notes on insecticides and a short survey of the activities of the Division of the Agricultural Department that deals with pests.

FULMEK (L.). **Ondervindingen met Venetan ter bestrijding van de bladluizen op Deli-tabak.** [Experiences with Venetan in combating Aphids on Tobacco in Deli.]—*Deli Proefst.*, Vlugschr. no. 27, 4 pp. Medan, July 1924.

Venetan is a proprietary insecticide containing a nicotine-like substance and a ketonic compound. It was found that a strength of at least 3 per cent. is required to give any good result against *Myzus persicae*, Sulz., on tobacco. It must not be mixed with lead arsenate or used after spraying with the latter, or scorching will ensue. At a strength of 5 per cent. it produces scorching in seedlings.

VAN EMDEN (F.). **Zur Biologie von** *Thorictodes heydeni*, **Reitt. (Col. Thorictidae).** [A Contribution to the Biology of *T. heydeni*.]—*Treubia*, vi, no. 1, pp. 1–7, 6 figs. Buitenzorg, June 1924.

A manure used for tea plants and consisting of kapok seeds was found to be infested with the Thorictid beetle, *Thorictodes heydeni*, Reitt., which has been supposed to prey on insects infesting stored rice, but is probably a pest of such rice. A complete description is given of the larva.

FULMEK (L.). **Eine neue Hystricothripide auf** *Eugenia* **sp. in Sumatra.** —*Treubia*, vi, no. 1, pp. 8–11, 5 figs. Buitenzorg, June 1924.

Hystricothripoides karnyi, gen. et sp. n., is described from the foliage of *Eugenia* in Sumatra, associated with *Heliothrips haemorrhoidalis*, Bch.

ULTÉE (A. J.). **Verslag over de werkzaamheden van het Proefstation Malang in het jaar 1923.** [Report of the Malang Experiment Station for 1923.]—*Meded. Proefst. Malang*, no. 48, 27 pp. Soerabaya, 1924.

The coffee berry borer [*Stephanoderes hampei*] was the chief pest in 1923. Owing to the large crop, coffee had to be quickly air-dried and bagged instead of being thoroughly dried in the drying sheds, and yet this process was found to have been sufficient to kill the borer and its brood. An apparatus for destroying the borer in harvested berries by steam has been reported on elsewhere [*R. A. E.*, A, xii, 368]. Coccids came next in importance on coffee, especially *Pseudococcus citri*. In one locality lamtoro [*Leucaena glauca*] was defoliated by the caterpillars of a species of *Orgyia*, which subsequently attacked tea and coffee.

DUPORT (L.). **Rapport sur quelques-unes des recherches poursuivies à la Station [Entomologique de Cho-Ganh] d'octobre 1922 à avril 1924.**—*Sta. Ent. Cho-Ganh, Bull. périodique*, no. 19, 5 pp. Hanoi, 1924.

The rearing of the Braconid, *Doryctes strioliger*, Kieff., and of the Bethylid, *Sclerodermus domesticus*, Kieff., parasites of *Xylotrechus*

quadripes, Chevr. (coffee borer) has been continued as in previous years [*R. A. E.*, A, x, 586, etc.]. *D. strioliger* can only breed in numbers during the most favourable weather, and these periods are unfortunately too short during the winter months to admit of rearing from egg to adult. However, during the last four years, some 4,000,000 of this Braconid have been reared under sheltered conditions at the Station, of which 1,800,000 have been disseminated in the plantation at Cho-Ganh, 2,000,000 sent off to various planters for distribution over their estates, and the rest kept for breeding. Unfortunately, no decrease in losses due to the borer seems to have occurred as a result of these distributions. The rearing of *S. domesticus* is progressing favourably, and it is hoped to test its value on a large scale in the Cho-Ganh plantation. It is thought that rearing from *Chlorophorus annularis*, Fairm. (a beetle allied to *X. quadripes*), might give better results, but unfortunately the life-cycle is much longer than that of *X. quadripes* and during a great part of the year only small larvae are to be found in the canes.

As regards other parasites of the borer, the Braconids, *Doryctes picticeps*, Kieff., and *D. tristriatus*, Kieff., have been reared without much success, but are still being experimented with ; the Ichneumonids and the Evaniid previously recorded as parasites of *X. quadripes* have been so scarce as to be useless for rearing purposes.

LIGHT (S. F.). **The Termites (White Ants) of China, with Descriptions of six new Species.**—*China Jl. Sci. Arts*, ii, nos. 1–4, pp. 50–60, 140–142, 242–254, & 354–358. Shanghai, January-July 1924.

The new termites described are *Calotermes sinensis* ; *Cryptotermes campbelli*, living in boards or furniture ; *Termes hainanensis*, which destroys wood lying on the ground, but seldom attacks dwellings ; *Reticulitermes fukienensis*, associated with other common species ; *Macrotermes barneyi* ; and *Capritermes sowerbyi*, an earth-dwelling species.

The status of the four species of termites hitherto reported from China, *Coptotermes formosanus*, Shir., *C. hongkongensis*, Oshima, *Termes formosanus*, Shir., and *Odontotermes sinensis*, Holmg., is discussed, and a preliminary key given for the identification of the known species of Chinese termites.

KUWANA (I.). **Descriptions and Biology of new or little-known Coccids from Japan.**—*Dept. Agric. & Comm. Japan, Imp. Plant Quar. Sta.*, Bull 3, pp. 1–68, 14 pls. Yokohama, August 1923. (Review in *Science*, lx, no. 1544, pp. 101–102. Garrison, N.Y., 1st August 1924.)

The new Coccids described are *Prontaspis yanonensis* from *Citrus*, *Geococcus citrinus* and *Rhizoecus kondonis* from the roots of orange trees, and *Orthezia yasushii* from wild chrysanthemum and *Artemisia vulgaris*.

The three species of *Ceroplastes* occurring in Japan, *C. rubens*, Mask., *C. floridensis*, Comst., and *C. ceriferus*, And., with *Geococcus oryzae*, Kuw., previously considered to be a species of *Ripersia*, are discussed at length, with detailed descriptions of the various stages and the biology and host relationships when known.

Ishii (T.). **Observations on the Hymenopterous Parasites of** *Ceroplastes rubens* **Mask., with descriptions of new Genera and Species of the Subfamily Encyrtinae.**—*Dept. Agric. & Comm. Japan, Imp. Plant Quar. Sta.*, Bull. 3, pp. 69–114, 5 pls. Yokohama, August 1923. (Review in *Science*, lx, no. 1544, pp. 101–102. Garrison, N.Y., 1st August 1924.)

The new Hymenopterous parasites here described from Japan include *Clausenia* (gen. n.) *purpurea*, from *Pseudococcus* on *Citrus*; *Neocopidosoma* (gen. n.) *komabae*, from a Tortricid larva on *Elaeagnus*; *Cheiloneurus ceroplastis*, from *Ceroplastes rubens* and *C. ceriferus*; *Anabrolepis japonica*, from bamboo infested with *Eriococcus onukii*; *Aphycus timberlakei*, from *Lecanium* sp. on *Euonymus*; *Microterys ericeri*, from *Ericerus pela*; and *M. speciosus* from a Coccid. The biology, habits, host relations and economic importance of *Microterys speciosus* and *Coccophagus lecanii*, Fitch, with descriptions of their various stages, are included, the conclusion being reached that neither is effective in checking the increase and spread of their Coccid host.

Kuwana (I.). **On the Genus** *Leucaspis* **in Japan.**—*Dobutsugaku Zasshi* [*Zoological Magazine*], xxxv, no. 417–422, pp. 319–324, 1 pl. Tokyo, 15th December 1923. [Received 19th August 1924.]

The genus *Leucaspis* has hitherto been represented by two species in Japan, *L. japonica*, Ckll., and *L. bambusae*, Kuwana, but it is now considered that the latter should be referred to the genus *Chionaspis*. *C. pseudoleucaspis*, n.n., is suggested for it, as *bambusae* is preoccupied by *C. bambusae*, Ckll.

A detailed description is given in English of *L. japonica*, made from material collected in Japan, the country from which the original specimens came. The food-plants are apple, pear, *Citrus*, *Camellia*, *Paeonia*, maple, *Magnolia*, broom and many other plants.

It is common all over Japan, though not considered a serious pest. It has also been recorded from California, Brazil and India.

Annual Report of the Agricultural Experiment Station of Yamanashi for the Year 1923. Yamanashi, August 1924.

In this part of Japan *Phylloxera vastatrix* hibernates in the nymphal stage, and there are about nine generations a year. Brief notes are given on its life-history, control experiments, and immunity in vines.

On a Trichopteron injurious to the Rice Plant.—*Jl. Hokkaido Agric. Soc.*, no. 282, pp. 173–177. [Sapporo] June 1924.

The larvae of a species of Leptocerid feed on the roots and basal portions of the stalks of the rice-plant, doing serious damage in Hokkaido. There is one generation a year, and hibernation takes place in the larval stage in the stubble of the food-plant and other plants. The larvae begin to feed about the beginning of June and pupate about the end of that month, the latter stage lasting 10–14 days.

Control Experiments with Injurious Insects.—*Rept. Agric. Expt. Sta.*, no. 1, 213 pp. Nagano, March 1924.

The results of experiments against the more injurious insects, etc., in Nagano and some notes on their life-histories, are given.

Among those dealt with are *Chilo simplex*, Butl., *Tipula praepotens*, Wied., and *Parnara guttatus*, Brem., attacking rice; *Epilachna vigintioctopunctata*, F., feeding on the leaves of various plants; orchard pests, including *Eriosoma lanigerum*, Hausm., *Porthetria* (*Lymantria*) *dispar*, L., *Phalera flavescens*, Br. & Gr., injuring *Prunus* and *Pyrus*, *Carposina sasakii*, Mats., injuring the fruits of peach (*Prunus persica*), and *Cydia* (*Laspeyresia*) *molesta*, Busck, infesting the fruits of *Pyrus sinensis*; *Asteroptes noctuina*, Butl., on grapes; and *Diaspis pentagona*, Targ., and *Boarmia* (*Hemerophila*) *atrilineata*, Butl., on mulberry. The last part of the report deals with various insecticides.

Cottrell-Dormer (W.). **Sugar Pests and Diseases in the Mackay District.**—*Queensland Agric. Jl.*, xxi, pt. 6, pp. 428–435, 6 pls. Brisbane, June 1924.

This is a report of a survey of 52 farms in Queensland, and records the occurrence of the more usual sugar-cane pests, and of some miscellaneous ones, few of which are of much economic importance. In two localities, the Tenebrionid beetle, *Gonocephalum torridum*, the larvae of which gnaw very young cane roots, was present in tremendous numbers. The moths, *Mocis frugalis* and *Heliothis* (*Chloridea*) *obsoleta*, are of general distribution. Both are potential pests of sugar-cane, though grass and maize, respectively, are their natural food-plants, and sugar-cane is not attacked unless they are lacking.

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxi, pt. 6, pp. 436–437. Brisbane, June 1924.

Aphis sacchari, well-known as a sugar-cane pest in Java and elsewhere, was responsible for considerable damage to this crop in several areas in Queensland, where it is usually kept in check by numerous parasites and predators; an unusually dry season was probably the cause of the outbreak. Much sooty mould was present on the leaves, caused by the fungus, *Capnodium* sp., following the attacks of *A. sacchari*.

Conditions for rearing the Tachinid parasite [of *Rhabdocnemis obscura*], *Ceromasia sphenophori*, have been very favourable, and large numbers are being distributed. The green muscardine fungus, *Metarrhizium anisopliae*, is present in the cane fields and is responsible for killing a small percentage of third stage grubs of [*Lepidoderma*] *albohirtum*. It has been observed infesting other cane-grubs and the common weevil borer, *R. obscura*, and also larvae and adults of *Campsomeris tasmaniensis* and *C. radula*. The possibilities of using this fungus against the cane-borer are being investigated.

Allen (W. J.). **Spraying.**—*N.S.W. Dept. Agric.*, Farmers' Bull. 72, 7th edn., 76 pp., 20 figs. Sydney, March 1924. Price 1*s*.

The latest edition of this bulletin [*cf. R. A. E.*, A, x, 477] describes, with figures, a good deal of new apparatus for the preparation and application of sprays, etc., and gives a detailed spray calendar for the various crops, with instructions regarding the insecticidal and fungicidal value of various substances.

Girault (A. A.). **The Orange Tree Bug** (*Oncoscelis sulciventris*, **Stål**). **Supplementary Notes.**—*Queensland Agric. Jl.*, xxii, pt. 1, pp. 25–26. Brisbane, July 1924.

This is a supplement to the author's previous paper [*R. A.E.*, A, xii, 198] on *Oncoscelis sulciventris*, Stål (orange-tree bug), and deals with further field investigations. On the 3rd April, a mass of eggs was found to be infested with *Eupelmus poggioni*, Gir., which began emerging a week or so later. In the earlier paper, the sexes of the pest were confused, so that all details given respecting the male apply to the female and *vice versa*.

Ballard (E.). **Control of Cotton Pests.**—*Queensland Agric. Jl.*, xxii, pt. 1, p. 31. Brisbane, July 1924.

The three most destructive and generally distributed cotton pests in Queensland are *Heliothis* (*Chloridea*) *obsoleta* (maize grub), *Dichocrocis punctiferalis* (peach moth) and *Tectocoris banksi* (Chinese or harlequin bug). A brief outline is given of experiments for the control of these pests that are to be made during the coming season.

Ward (J. M.). **Mediterranean Fruit Fly** (*Ceratitis capitata*).—*Jl. Dept. Agric. Victoria*, xxii, pt. 7, pp. 427–433. Melbourne, July 1924.

Attention is drawn to the occurrence of *Ceratitis capitata* in various parts of Victoria. Previous observations regarding the effect of low temperatures and other remedial measures on this pest are given. It is most important that all infested fruit should be destroyed by burning, boiling or burying at a depth of not less than 30 inches. Recent experiments with poison baits [*R. A.E.*, A, xii, 411] are also quoted.

Veitch (R.) & Greenwood (W.). **The Food Plants or Hosts of some Fijian Insects. Part ii.**—*Proc. Linn. Soc. N.S.W.*, xlix, pt. 2, no. 196, pp. 153–161. Sydney, 2nd July 1924.

Since the publication of the first part of this paper, a considerable number of additional records have been obtained which have been arranged in a similar manner to those previously noticed [*R. A.E.*, A, x, 177].

Veitch (R.). **The Minor Pests of Sugar-Cane in Fiji.**—*Colonial Sugar Refg. Co., Ltd.*, Agric. Rept., no. 7, 30 pp., 7 pls. Sydney, December 1923. [Received 26th August 1924.]

The pests described can only be considered as relatively of minor importance, some of them being responsible for a considerable amount of damage. They are dealt with in three sections. Those boring in the stalk or attacking the eye are *Trochorrhopalus strangulatus*, Gyl. (small sugar-cane weevil borer), *Trachycentra chlorogramma*, Meyr. (moth borer of sugar-cane), *Xyleborus torquatus*, Eichh. (shot-hole borer of sugar-cane), *Decadarchis flavistriata*, Wlsm. (bud moth of sugar-cane) and the cricket, *Gryllus oceanicus*, Le Guill. Those eating the leaf are the army-worms, *Cirphis unipuncta*, Haw., and *C. loreyi*, Dup., *Cosmopteryx dulcivora*, Meyr. (sugar-cane leaf miner), *Melanitis leda*, L. (sugar-cane butterfly), the Noctuid, *Anticarsia irrorata*, F.,

and the locusts, *Cyrtacanthacris guttulosa*, Wlk., *Locusta migratoria* ph. *danica*, L., and *Acolopus tamulus*, F. Those sucking the sap are *Perkinsiella vitiensis*, Kirk. (sugar-cane leafhopper), the Derbid, *Pyrrhoneura sacchariciда*, Kirk., the Aleurodid, *Neomaskellia bergii*, Sign., and the sugar-cane mealybug, *Pseudococcus bromeliae*, Bch. In each case notes are given on the life-history and habits, as well as the value of biological and artificial control.

STOREY (H. H.). **The Transmission of a New Plant Virus Disease by Insects.**—*Nature*, cxiv, no. 2859, p. 245. London, 16th August 1924.

A disease similar to, but not identical with, mosaic disease of sugar-cane has been observed for many years in Natal. It occurs on sugar-cane, maize and other graminaceous plants. Experimental transmission from diseased to healthy maize plants has been obtained with adult Jassids of the genus *Balclutha* (an undescribed species). Hoppers from healthy plants failed to transmit the disease. All attempts to secure infection through the agency of *Aphis maidis*, Fitch, failed. In preliminary experiments, transmission of the disease from maize to sugar-cane and grasses did not occur. It must therefore remain doubtful whether a single disease occurs in the different plants, although field observations and similarity of symptoms point to this conclusion.

Agricultural Pests Act, 1911. Proclamations Nos. 142 and 143.—*Govt. Gaz. Union S. Africa*, p. 597. Pretoria, 27th June 1924.

The word " plant " as defined in the original Act now also includes unmanufactured broom corn, derived from *Sorghum*, whether green or dry ; unmanufactured cotton, including linters and unspun cotton waste, but not purified cotton wool and cotton batting ; unmanufactured cork from cork oak tree ; acorns ; and chestnuts. All the above, except acorns and chestnuts, together with herbaceous plants, are deemed plants, the introduction of which is prohibited, supervised or restricted.

Departmental Activities. Entomology.—*Jl. Dept. Agric. Union S. Africa*, ix, no. 1, pp. 2–3. Pretoria, July 1924.

The mite, *Histiogaster carpio*, Kram., has been found in enormous numbers in empty wine vats. Washing with a 5 per cent. caustic soda solution killed the mites within 3 hours, and fumigation with 3 lb. sulphur per 1,000 cu. ft. for 24 hours killed them even when in layers half an inch thick. These methods, as well as steaming, are commonly practised for cleaning wine vats, and should be repeated after 12–14 days, to kill any mites that emerge from eggs after the first treatment. *Chrysomphalus aurantii*, Mask., has recently been recorded in Durban, on mulberry and fig plants from India.

In view of misleading statements that have been published, it is stated that Isle of Wight disease of bees has not been recorded anywhere in South Africa.

Departmental Activities. Entomology.— *Jl. Dept. Agric. Union S. Africa*, ix, no. 2, pp. 98–100. Pretoria, August 1924.

Diparopsis castanea, Hmps. (red bollworm) was the most common and destructive of the three bollworms occurring on cotton during the past season, the other two being *Heliothis* (*Chloridea*) *obsoleta*, F. (American bollworm) and *Earias insulana*, Boisd. (spiny bollworm).

Once in every two or three years serious damage is done to orange trees in the southern part of Natal and the Cape Province by the larvae of a Longicorn, *Tragocephala comitessa*, White. The San José scale [*Aspidiotus perniciosus*, Comst.] was found in June on peach trees in Natal. The trees were imported from New South Wales, and bore a certificate of fumigation. It has also been detected in three Johannesburg nurseries. An account is given of the soft scale [*Coccus hesperidum*, L.], which infests a wide range of fruit trees. The most satisfactory remedial measure is fumigation with hydrocyanic acid gas; other measures are contact insecticides, such as resin wash or miscible oils, and a soap wash consisting of 1 lb. soft or hard soap and 8 gals. water. This should be applied warm.

Storey (H. H.). **Diseases of Sugar-cane of the Mosaic Type in South Africa. Part I. True Mosaic, Mottling, or Yellow Stripe Disease.**— *Jl. Dept. Agric. Union S. Africa*, ix, no. 2, pp. 108–117, 2 pls., 1 fig. Pretoria, August 1924.

The author's summary of this paper is as follows: Mosaic disease, which is the cause of severe loss in many cane-growing countries, is widely distributed in Natal upon every variety of cane except Uba. The disease is characterised by a mottling of the leaves with pale shades of green or yellow, and a reduction in the power of growth. The complete eradication of all varieties except Uba is recommended as a practicable means of eliminating the disease.

Besides a consideration of the symptoms of the disease and varietal susceptibility, etc., the work of previous authors on insect transmission is briefly reviewed.

Hargreaves (H.). **Annual Report of the Government Entomologist.**— *Uganda: Ann. Rept. Dept. Agric. 1923*, pp. 15–21. Entebbe, 1924.

A study of *Antestia lineaticollis*, Stål (variegated coffee bug) during 1923, indicated that pruning encourages damage by the bug, owing to the absence of shade, and the succulent new growth produced. Collecting the eggs only for the breeding-out of parasites is of little use; when the bug is found to be on the increase, all stages should be collected, the eggs being retained for the parasites. A new Tachinid parasite of *A. lineaticollis* has been observed, the larva of which lives in the body of the adult bug, though whether the bug is parasitised before reaching the adult stage is not known.

Damage by *Stephanoderes hampei*, Ferr. (coffee berry borer) was negligible in 1923. During April, the borer was gradually controlled by the Bethylid, *Prorops nasuta*, Wtrst., which oviposits on the full-grown larva of the beetle. In 3 or 4 days the eggs hatch, and the parasitic larva feeds externally on its host; a few days later it spins a silk cocoon and pupates inside the bored berry. In another 18 to 24 days the adult parasite emerges, and in 12 days begins to oviposit.

Parthenogenesis is common, the progeny in such cases being males. *P. nasuta* is larger than the parasite prevalent in 1921 [*R. A. E.*, A, xi, 32]. During July, another (unnamed) parasite gradually replaced *P. nasuta*, and appears to be the most important in controlling the borer. The adult, unlike the other two species, does not spend part of its life within the coffee berry, but flies about, ovipositing through the bore holes on eggs and larvae of its host in the berry. The larvae feed on the eggs, larvae and pupae of the beetle, and on the larvae of the other species of parasites, and also seem to be cannibalistic. The larval stage probably occupies at least 20 days; pupation occurs in the berry.

Pseudococcus citri, Risso (coffee root mealybug) seemed to be restricted to certain types of soil. Experiments with soil insecticides were tried, and the results are tabulated. Tobacco-soap solution, applied after scraping the roots, seemed to give the best results, the trees appearing healthy 3 months after treatment, while few mealybugs remained. Other coffee pests were the Capsid, *Lycidocoris mimeticus*, R. & P., which was particularly numerous on an area of coffee shaded by *Grevillea robusta*, and destroyed the young leaves and terminal buds, thus stimulating abnormal secondary growth; *Diathrothrips coffeae*, Will., of which there were several outbreaks during the long, dry season; caterpillars of *Parasa* sp. and *Metadrepana glauca*, Hmp., which eat the leaves; *Apate* spp., which bore in the stems, and can be controlled by inserting crystals of paradichlorobenzene in the borings, and then plugging them with moist clay; *Dirphya princeps*, Jord. (yellow-headed stem borer); the grasshopper, *Zonocerus variegatus*, L; the Cucujid, *Laemophloeus pusillus*, Schön., which attacks the beans of over-ripe coffee berries, and has also been found in the fruits of wild Rubiaceae; *Coccus viridis* (green scale); and a leaf-eating weevil (*Isaniris* sp.), which, however, was not present in serious numbers.

Cotton pests included *Earias insulana*, Boisd. (spiny bollworm); an unidentified red bollworm, which pupates within the boll; *Aphis gossypii*, Glov. (cotton aphis), one of the most serious pests of cotton, though checked to some extent by Coccinellids and by a Hymenopterous parasite, which sometimes destroys 90 per cent. of the Aphids; *Acrocercops bifasciata*, Wlsm., which has only recently been observed mining the leaves of very young cotton plants; *Oxycarenus* spp.; *Dysdercus* spp., one species of this genus having been found on the wild *Hibiscus sabdariffa*; *Arctornis* ? *producta*, Wlk. commonly known as a feeder on *Ricinus communis* (castor-oil plant) and producing very small adults when reared on cotton; *Sylepta derogata*, F. (cotton leaf-roller); and *Brachytrypes membranaceus*, Drury.

Fruit and fruit-tree pests included, on peach, *Carpophilus dimidiatus*, F., and *C. binotatus*, Murr., which bore into the ripening fruits; the Chrysomelid, *Megalognatha rufiventris*, Baly, which attacks the flowers of both peach and loquat; *Cosmopolites sordidus* Germ. (banana borer) on bananas; the Cerambycid, *Inesida leprosa*, F., a new pest in Uganda, which has killed many stems of mulberry; and the weevil, *Cryptorrhynchus* (*Sternochetus*) *mangiferae*, F., found for the first time in Uganda and of very rare occurrence, and *Ceratitis* ? *flexuosa*, Wlk., on mango, the latter also occurring in rose-apple [*Eugenia jambos*].

Vegetable pests included *Bruchus obtectus*, Say, on ripening beans; *Acraea* sp. and *Cylas formicarius*, F., on sweet potatoes; *Dacus* (*Tridacus*) *bivittatus*, Big., on vegetable marrow; *Aspidiotus lataniae*, Sign., *Plutella maculipennis*, Curt., and *Prodenia litura*, F., on cabbage;

a grasshopper, *Phymateus cinctus*, F., on garden peas; *Lobesia sitophaga*, Meyr., a recently discovered caterpillar feeding on millet seed; *Gryllotalpa africana*, P. de B., on rice; and *Aspidiotus gowdeyi*, Newst., on para rubber [*Hevea brasiliensis*].

Pests of shade and ornamental trees included *Oryctes monoceros*, Ol. (rhinoceros beetle) on palms; *Ceroplastes ? ugandae*, Newst. on *Albizzia* sp.; and the Chrysomelid, *Mesoplatys ochroptera*, Stål, on *Sesbania aegyptica*.

The silk produced by *Anaphe infracta*, Wlsm., is still being tested in England, and it is not yet known whether this can be made a profitable industry for export.

Carpophilus humeralis, L., *Typhaea stercorea*, L., *Alphitobius piceus*, Ol., and *Cryptorrhynchus mangiferae*, F., were all intercepted in seeds imported from Tanganyika Territory.

Wilkinson (H.). **Annual Report of the Assistant Government Entomologist.**— *Uganda: Ann. Rept. Dept. Agric. 1923*, pp. 22–24. Entebbe, 1924.

The information in this report dealing with *Antestia lineaticollis*, Stål, has already been noticed [*R. A. E.*, A, xii, 264].

Bezzi (M.). **The Bombyliidae of the Ethiopian Region, based on Material in the British Museum (Natural History).**—8vo, viii+390 pp., 46 figs. London, British Museum (Natural History), 1924.

This useful monograph contains a catalogue of the Ethiopian species of Bombyliidae at present known, and gives a general survey of the family, with notes on the classification and geographical distribution. Keys are included to the groups, subfamilies and genera, with many keys to the species of the genera dealt with, and many new species are described.

The economic importance of the family is considerable, owing to the wide range of parasitism exhibited. The genus *Hemipenthes* is a parasite of parasitic Hymenoptera (*Ophion*, *Banchus*), and of parasitic Diptera (*Masicera*) living at the expense of nocturnal Lepidoptera. Species of *Villa*, of the *flava*-group, are parasites of the nocturnal Lepidoptera (*Mamestra*, *Panolis*, *Agrotis*, *Dichromia*, *Taeniocampa*, etc.), and those of the *ixion*-group, such as *V. pygarga*, Lw., are parasitic on Cistelid larvae (*Podonta nigrita*, F.). *Thyridanthrax* is parasitic in egg-cases of locusts (*Dociostaurus* (*Stauronotus*) and *Arcyptera*), or in Dipterous puparia of the genus *Glossina*. *Chrysanthrax* is a parasite of Scoliid wasps of the genus *Elis*, themselves parasitic on larvae of Lamellicorn beetles. The two North American species of *Exoprosopa*, *E. fascipennis*, Say, and *E. pueblensis*, Jaenn., are parasites of Hymenoptera (*Tiphia* spp.), which are parasitic on *Lachnosterna*, but it is very probable that the majority of Ethiopian species feed on the egg-cases of locusts, this habit being characteristic of the entire family.

Carpenter (G. H.). **Insects: Their Structure and Life. A Primer of Entomology.**—2nd edn., xi+335 pp., 4 pls., 184 figs. London & Toronto, J. M. Dent & Sons, Ltd., 1924. Price 10*s.* 6*d.* net.

This is a second edition of this valuable handbook, originally published twenty-five years ago. It is a standard work, dealing in brief

with the whole subject of entomology, including chapters on morphology, life-history and development, classification and evolution, the orders and pedigree of insects, and insects in relation to their surroundings, and is of interest to the general reader as well as to those taking up entomology as a profession. A good deal of the subject matter has been revised, especially the chapters dealing with evolution, in view of important results revealed by recent investigations. A classified bibliography of 237 works and a detailed index are appended.

Ripley (L. B.). **Sodium Fluoride as an Insecticide ; its Possibilities as a Locust Poison.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 29–34. London, August 1924.

Owing to the largely increased use of arsenical poisons during the last decade there is a likelihood of much higher prices and possibly a shortage of supply of arsenic. Experiments have therefore been made with sodium fluoride as a substitute stomach poison for insects, this substance having the advantage of being cheaper and less injurious to man, stock and birds.

The conclusions reached by the author, as a result of experiments, are as follows : Sodium fluoride is effective as a stomach poison against cutworms and the brown locust [*Locustana pardalina*, Wlk.], but is not so toxic as sodium arsenite to either. In the laboratory, grass or horse-dung treated with a 2 per cent. solution of sodium fluoride gave good results against adult locusts, and bait treated with 1 per cent. solution was effective against cutworms (*Euxoa* spp.). Sodium fluoride is not repellent to cutworms, whereas sodium arsenite is highly repellent. Paris green repels to a less extent. Sodium fluoride dust probably does not act as a contact poison on adult locusts. If it does, strengths much greater than 1 : 20 are required to act in this way. It is considerably less toxic to higher animals than sodium arsenite, and should be investigated further as a promising substitute for arsenicals against various insects.

Uvarov (B. P.). **A new Long-horned Grasshopper damaging Coconut Palms in New Britain.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 35–36, 1 fig. London, August 1924.

Habetia defoliaria, sp. n., is described from New Britain, where some coconut palms have been completely defoliated by it. The other three species of this genus have all been described from New Guinea.

Lean (O. B.). **The Treatment of small Batches of Cotton Seed against Pink Bollworm.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 37–40. London, August 1924.

The work of previous investigators has led to the conclusion that the simplest and surest method of treating large quantities of cotton seed infested with *Platyedra gossypiella*, Saund. (pink bollworm), is by heat. In dealing with small batches of seed in Great Britain fumigation with carbon bisulphide was first tried, but has now been replaced by heat treatment. This is carried out in an ordinary anhydric electric oven fitted with a number of perforated metal trays, the seed being spread in thin layers on the trays, allowing considerable air space between them. With regard to the determination of the temperature necessary

to kill the insects without affecting germination of the seed the conclusions reached by various workers are quoted, and, acting on these, experiments were made that are described and the results shown in a table. It was found that in an anhydric oven the seed should be heated for 90 minutes with the oven at 60°C. (140°F.). This ensures the death of all insect life and does not damage the germinating power of the seed. In the experiments one hour's treatment was sufficient to kill all larvae of *P. gossypiella*. Adult beetles, including species of *Tribolium*, *Niptus* and *Anobium*, and larvae of *Alphitobius* sp., were all killed within 5 minutes under this treatment, while adults of *Calandra oryzae* were all dead within half an hour.

GREEN (E. E.). **On some new Species of Coccidae from various Sources.** —*Bull. Ent. Res.*, xv, pt. 1, pp. 41–48, 6 figs. London, August 1924.

A key is given to the species of the genus *Alecanopsis*, which was founded to contain the single species, *Lecanopsis filicum*, Mask., and to which three new species are now added. These are *A. tenuis*, taken from hollows caused by boring insects in stems of *Banksia integrifolia* in Victoria, Australia; *A. mirus*, from nests of *Cremastogaster australis*, in Queensland; and *A. grandis*, from a fern rhizome from the burrow of an ant, *Camponotus intrepidus*, K., from New South Wales.

Other new species described are *Asterolecanium charmoyi*, on foliage of *Bambusa* in Mauritius; *Ripersia exul*, from nests of ants in the Channel Islands; and *R. longisetosa* in nests of an ant (*Plagiolepis* sp.) in Cape Colony. *Pseudococcus cimensis*, n. n., is proposed for *P. artemisiae*, Green, recorded from Madeira, this name being preoccupied by *P. artemisiae*, Essig, though Essig's species has since been referred to *Erium lichtensioides*, Ckll.

HARGREAVES (E.). **The Action of some Organic Compounds when used as a Stomach Poison for Caterpillars.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 51–56. London, August 1924.

A number of tests have been made in an endeavour to find an efficient substitute for arsenates that would be much less toxic to higher animals and yet suitable as a stomach poison for caterpillars. The larvae used in the tests were those of *Pieris rapae*, L., and *Spilosoma lubricipeda*, Esp., with leaves of cabbage and lupin respectively for food.

The technique of the experiments is described, and a table of the results is given. The dinitrocresylates proved very toxic, all the strengths used being deterrent. Ammonium dinitro-ortho-cresylate was markedly deterrent and proved the most toxic. All other metallic organic compounds tested were relatively innocuous, with the exception of two barium salts, both related to naphthaline. All naphthaline derivatives proved generally toxic, particularly naphthols, naphthylamine and chlor- and nitro-naphthalines. There appear to be possibilities in chlororthocresol, monochlorphenanthrene, dinitrophenol and dianesidine, or some of the compounds related to them. Barium and calcium fluorides were highly toxic and fluor-spar shows promise as an insecticide.

Williams (C. B.). **An Improved Light Trap for Insects.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 57–60, 2 figs. London, August 1924.

The trap described is an improved form of that previously devised [*R. A. E.*, A, xi, 244]. It differs from the first model in the absence of mirrors and in the arrangement of the legs, which, in the new pattern, completely enclose the trap when it is not in use, forming a box about 2 ft. square by 9 in. deep.

The author adds a note to the effect that excellent results have been obtained by using potassium cyanide as a killing agent instead of carbon tetrachloride. A lump of cyanide weighing about 1 oz. (as supplied for fumigation purposes) is enclosed in a thin layer of moist plaster of Paris, which rapidly dries. This lump is kept in a bottle when not in use and is placed in the box of the trap when in use. A strong poison atmosphere is thus maintained, and the method is cheaper and more convenient than the use of carbon tetrachloride, while apparently giving as good results.

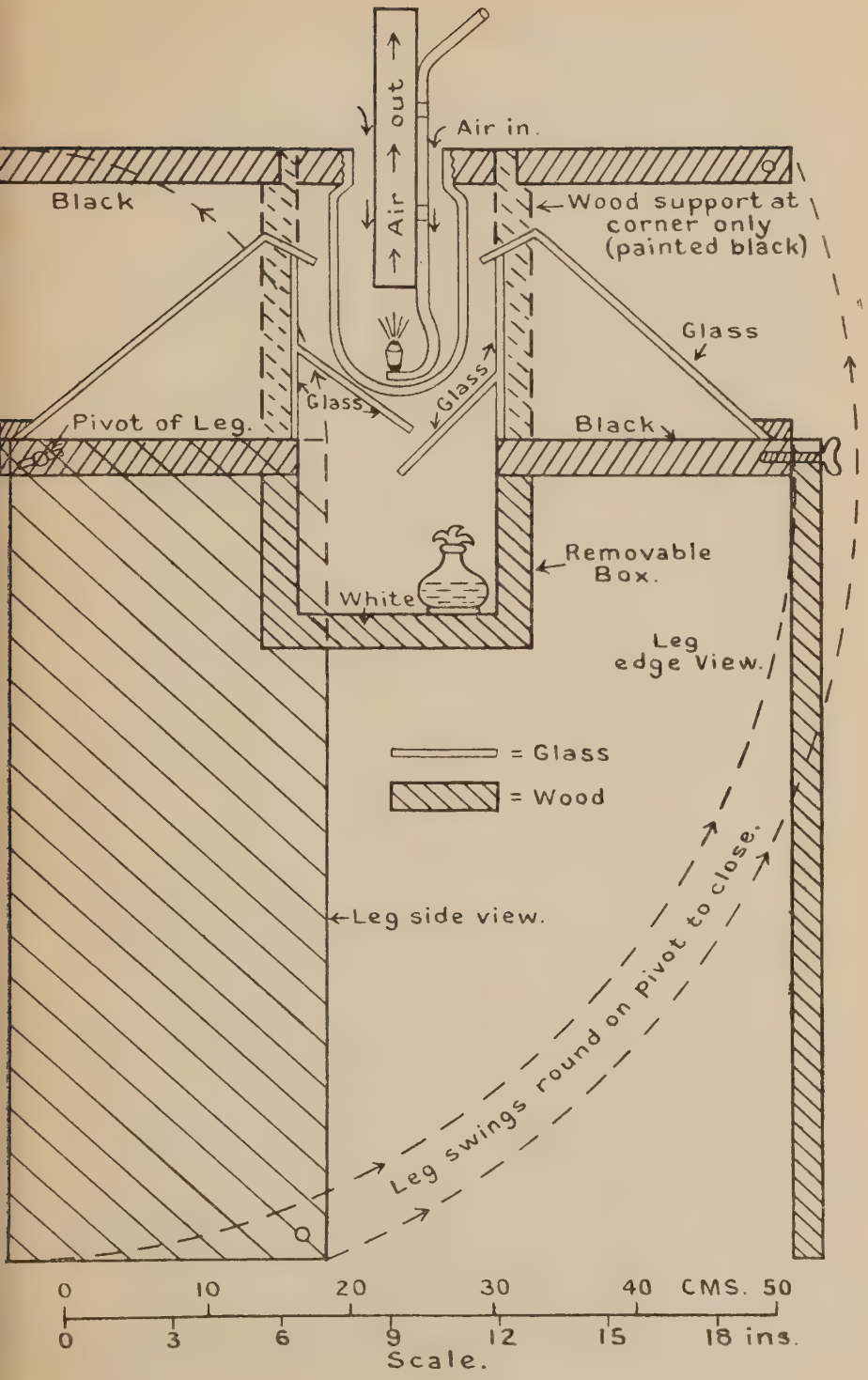
Waterston (J.). **A new Chalcid attacking Bamboo in India (Hymenoptera).**—*Bull. Ent. Res.*, xv, pt, 1, pp. 69–71, 2 figs. London, August 1924.

The Chalcid, *Eurytoma chrysothrix*, sp. n., is described from bamboo from South India.

Frew (J. G. H.). **On *Chlorops taeniopus* Meig. (The Gout Fly of Barley.)**—*Ann. App. Biol.*, xi, no. 2, pp. 175–219, 4 figs., 2 pls. Cambridge, July 1924.

These investigations on the life-history of *Chlorops taeniopus*, Mg. (gout fly) have been mainly concentrated on those aspects of the problem that seemed to offer the greatest probability of indicating control measures.

The life-history is described in detail. There are two generations a year, the summer one occurring mainly on spring barley (though in seasons favourable to the fly it may also occur on couch grass, *Agropyrum repens*), and the winter one mainly on couch grass. During the summer of 1922 a field of wheat was attacked, owing to the fact that it had made extremely poor growth during the winter and early spring, and was very backward at the time the flies oviposited. Adults emerging from the summer generation can utilise six types of food-plant, the type depending mainly on the time at which they emerge. During 1922 the flies were emerging throughout August and September, the height of emergence occurring between 8th and 24th August. Eggs were laid on the following plants : couch grass, which is probably the only available food-plant for the earliest emerging flies ; late, non-earbearing tillers of spring barley coming up after harvest ; self-sown barley due to grain shaken from the ears of spring barley at harvest ; late tillers and self-sown barley growing up after the harvesting of winter barley. The last is actually preferred to couch grass, but owing to the relatively small amount of winter barley grown in the district under observation it is fortunately not very abundant. The above mentioned food-plants, with the exception of couch grass, are only a source of danger when the barley is followed by a clover ley, so that the barley shoots are allowed to stand all the winter. If the land is ploughed in or the clover cut for fodder during the winter the larvae within the shoots are destroyed. Autumn-sown wheat and barley


Air out
Air in.
Black
Wood support at corner only (painted black)
Glass
Glass
Glass
Pivot of Leg.
Black
Removable Box.
White
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Leg swings round on pivot to close.
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Scale.

may be attacked if they are sown sufficiently early. In captivity the flies could not be induced to lay eggs after the middle of October, so that autumn sowing would have to be done as early as September to endanger these plants. Lastly, self-sown barley or wheat round a straw stack is frequently suitable for the winter generation. The general effect of attack on plants by either generation is to produce stunting and thickening of the attacked shoot with considerable increase in the breadth and moderate increase in the thickness of the leaves. The various forms of injury by both generations are described in detail.

A typical life-cycle is as follows: flies emerging from the winter food-plants (couch grass) towards the end of May lay their eggs on the leaves of the shoots of spring barley. These hatch in about 8 days, and the larvae make their way into the centre of the shoot to the young ear. They eat their way down one side of the ear and down the internode below it. Pupation occurs in the shoot during July. The majority of the flies emerge about 36 days later and lay their eggs on the winter food-plant. The larvae hatching from these eggs pass the winter in the grass shoots, pupating in March. The pupal period of this generation is slightly over 60 days, the adults emerging during the end of May and beginning of June. The length of life of the adult flies is probably about a fortnight for flies emerging in spring, but may be over two months for the autumn-emerging flies.

Four Hymenopterous parasites of *C. taeniopus* are being studied, two so far unidentified ectoparasites and two endoparasites, the Braconid, *Coelenius niger*, Nees, and the Chalcid, *Pteromalus micans*, Ol. The latter has been found in both generations. Observations so far indicate that all measures undertaken for the promotion of early plant growth will reduce the parasitisation of the summer generation; on the other hand, there is reason to believe that *C. taeniopus* would be forced to concentrate on couch grass, which would probably stabilise the balance between the host and its parasites.

Detailed experiments with various manures show that certain ones, particularly superphosphates, have a marked beneficial effect in reducing infestation of summer barley, this effect being entirely due to the stimulating effect upon the maturing of the ear and the growth of the ear-bearing internode. Large dressings have a tendency to retard growth and so increase infestation. Preventive measures recommended are early sowing of spring barley, good cultural conditions of the soil, and manuring with superphosphate or farmyard manure.

"Mathetes." **Statistical Study on the Effect of Manuring on Infestation of Barley by Gout Fly.**— *Ann. App. Biol.*, xi, no. 2, pp. 220–235. Cambridge, July 1924.

Mathematical calculations, the methods of which are described, show that in the above experiments the best results are obtained with farmyard manure, complete minerals, or superphosphate.

Speyer (E. R.) & Owen (O.). **The Action of some Organic Compounds upon the Cucumber-house Woodlouse.**— *Ann. App. Biol.*, xi, no. 2, pp. 236–243, 1 fig. Cambridge, July 1924.

Experiments for the control of *Armadillidium speyeri*, Jackson (cucumber-house woodlouse) are described in detail, the results having already been noticed from a shorter account [*R. A. E.*, A, xii, 431].

Grabham (M.). *Pseudococcus sacchari*, **Ckll., and its Associates in Madeira.**— *Ann. App. Biol.*, xi, no. 2, pp. 261–263. Cambridge, July 1924.

The history of sugar-cane cultivation in Madeira is briefly reviewed. Though *Pseudococcus sacchari*, Ckll., occurs throughout the plantations, its presence, even in enormous numbers, does not appear to affect the yield of the cane, which is of the Uba variety. The mealybugs are most numerous wherever the Argentine ant, *Iridomyrmex humilis*, Mayr, occurs. This was introduced about 30 years ago and has become generally abundant. *P. sacchari* is found in every sugar-cane plantation, the young migrating females being found under every leaf-sheath that has separated sufficiently from the growing stem for them to enter. The colonies at the nodes where they congregate number anything from 20 to 100 individuals in every stage of growth. They are all females and reproduce parthenogenetically. Only one male has been seen, in March 1923. As soon as the lower leaves dry and retreat from the stem, the younger individuals migrate upwards. They can withstand immersion in rainwater for several days. The cane is cultivated, manured and cut year after year, sometimes for 20 years without replanting, and remedial measures against *P. sacchari* are never undertaken. It is not even destroyed by natural enemies, as the few Coccinellids that existed originally have been exterminated by the protecting ants. The introduction of these beneficial insects would therefore be useless.

Wilson (G. F.). *Thereva plebeia* **L. as a Pest of Economic Importance.**— *Jl. R. Hortic. Soc.*, xlix, pt. 2, pp. 197–202, 2 figs. London, July 1924.

Descriptions are given of the mature larval, pupal and adult stages of *Thereva plebeia*, L., with an account of observations made during the period 1921–1923 [*R. A. E.*, A, xii, 139].

Wilson (G. F). **The Eelworm Disease of Phloxes.**— *Jl. R. Hortic. Soc.*, xlix, pt. 2, pp. 203–210, 8 figs. London, July 1924.

A detailed account is given of *Tylenchus dipsaci*, Kühn. (*devastatrix*, Kühn.), infesting herbaceous perennial phloxes. Other varieties are also liable to attack. The symptoms of infestation are described; they vary according to the season and severity of attack, and may sometimes be mistaken for injury resulting from drought. The commonest abnormality of the foliage is a crinkled or rolled condition, owing to the presence of eelworms in the vascular tissue of the stem and petioles. When cracking of the stem is due to eelworm infestation the cracks are particularly deep, and may extend down to the pith. The malformed tissues are inhabited by large numbers of *T. dipsaci*. The cells of the soft tissues of the stem are considerably enlarged, and in time usually separate from one another. Other species of eelworms, Enchytrids, mites (*Tyroglyphus longior*, Gerv., var.) and tardigrades are frequently found in the decayed tissues during the winter months, but these feed on the dead parts of the plants and are normal inhabitants of the soil and harmless to plants. During the autumn the eelworms pass from the diseased plant into the soil. Some enter the basal buds of the same or possibly fresh plants, whilst others hibernate among the pith cells of the old stems and pass to young growths in

the spring. The greatest number of eelworms is found in the soil during November. Egg-laying begins soon after spring growth starts and continues throughout the spring and summer; all stages may be found in the tissues during June and July. By the middle of August the adults and larvae are making their way down to the soil and underground stems, but are never found in the roots. The first damage is done by the hibernating individuals in the underground stems.

Infection is spread by two principal means, actual migration in the soil and carriage in plants, soil or manure or by wind and water. Various experiments definitely prove that *T. dipsaci* can penetrate healthy living tissue of herbaceous phloxes. The only way to avoid infestation is to use eelworm-free soil and plants. Neither phloxes nor any other susceptible plant should be planted in soil known to contain eelworms for a period of seven years after an outbreak has occurred. It is not yet known whether the eelworm is ever carried in the seed. Root cuttings do not carry it so long as the roots are washed completely free from the soil surrounding them. When the dead flowering stems are cut down in the autumn they should be cut as low as possible, to prevent the eelworms hibernating in the dead pith cells, though many will be found in the underground stems.

Cunliffe (N.). **The Frit Fly and its Relation to the Yield of Oats.**—*Jl. Minist. Agric.*, xxxi, no. 6, pp. 568–572, 1 fig. London, September 1924.

This information has been noticed from a more detailed paper [*R. A.E.*, A, xii, 284].

Topi (M.). **Ancora sulla esistenza di diverse specie di filossera della vite e sulla attaccabilità delle viti americane da parte della filossera.** [A further Note on the Existence of various Species of Vine *Phylloxera* and on the Susceptibility of American Vines to Attack.] —*Atti R. Acad. Naz. Lincei*, Rendiconti, Classe sci. fis. mat. e nat., xxxiii, 1 sem. no. 12, pp. 528–530. Rome, 15th June 1924.

In a preceding paper Börner's view that there are two distinct species of *Phylloxera* of the vine, *P. vastatrix*, Planch. (northern form) and *P. vitifolii*, Fitch (southern form), was controverted [*R. A.E.*, A, xii, 188]. Another hypothesis of Börner's is dealt with here, namely, that *P. vitifolii* may behave on European vines in the same way as it does on *Vitis riparia* [*cf. R. A.E.*, A, xi, 433], *i.e.*, that infestation is confined to the young roots and disappears in the following autumn or winter. According to Börner, *P. vitifolii* (infesting *V. riparia*) would be a second grade pest, while *P. vastatrix* (infesting *V. labrusca*) would be the real destroyer of Italian vines. Careful examination has shown, however, that the root infestation of Italian vines by the *Phylloxera* of *V. riparia* is a lasting one, and that a more or less partial disappearance of infestation, such as occurs with American vines, is not to be hoped for.

Other examinations have again shown that it is very difficult to infect American vines by means of infested roots. The result was the same whether the roots came from a cold and damp locality (Arizzano) or from a warm region (Tuscany).

Sabbato (F.). **Par la lotta contro la bianca-rossa.** [Work against *Chrysomphalus dictyospermi*.]—*Il Picentino*, xiii, no. 8, pp. 138–139. Salerno, August 1924.

For about two years *Chrysomphalus dictyospermi* has been doing very great injury to citrus trees in the province of Salerno, mainly owing to the failure of the growers to use the calcium polysulphide sprays now recognised as effective for combating it.

Voukassovitch (P.). **Action des traitements arsenicaux de la belle saison sur les chenilles de la Pyrale** (*Oenophthira pilleriana*, **Schiff.**).—*Rev. Zool. agric. & appl.*, xxiii, no. 6, pp. 133–141. Bordeaux, June 1924.

In experiments on the effect of arsenicals against *Sparganothis* (*Oenophthira*) *pilleriana*, Schiff., it was found that the larvae do not eat vine leaves coated with arsenicals, but merely nibble them in several places. The quantity of arsenic thus absorbed is seldom sufficient to kill any but very young larvae. The best results were obtained with lead arsenate in a 0·5 per cent. solution, but the experiments have shown that arsenical treatments against these larvae should be made as early as possible, that the dose should be stronger than that heretofore employed, and that the applications should be repeated until all parts of the vine are covered. Owing to the rapidity of growth of the vine, the treatments must be repeated at frequent intervals. The present experiments have shown that, for poisoning to be successful, young larvae must remain for 8 hours, and mature ones for several days, on foliage thoroughly coated with 0·3 per cent. lead arsenate solution, and as this is practically impossible in the case of a growing vine, it is questionable whether arsenical sprays can be profitably employed. It should be remembered, however, that they can easily be combined with fungicides; that they do not require a long preparation or particular care in keeping, and that if they could be rendered more adherent they would be of greater value.

Feytaud (J.). **Les traitements insecticides contre la Cochylis et l'Eudémis. Le Savon-Pyrèthre.** –*Rev. Zool. agric. & appl.*, xxiii, no. 6, pp. 142–145. Bordeaux, June 1924.

The history of the use of pyrethrum as an insecticide since 1890 is traced, with the recommendations of various investigators. Since the powder is only efficacious when made with fresh flowers, and as it is impossible to judge the quality of the manufactured article, the advantage of raising a crop of *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium* on the spot is obvious. The recommendations of other authors with regard to cultivation of the crop and preparation of the powder are quoted. Much better results are obtained if the insecticide is used in liquid form, such as the well-known pyrethrum-soap solution, and it should be directed against the larvae of the first generation of the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.], that is, generally speaking, about the 10th or 15th of June in the Bordeaux region.

MARCHAL (P.). **Les Néonates dans le genre** *Eriosoma*, **Leach** (=*Schizoneura*, **Hartig**).—*Rev. Path. vég. & Ent. agric.*, xi, no. 1, pp. 46–55. Paris, January-March 1924. [Received 5th September 1924.]

The characters of the first larval stage of Aphids are of great importance, as they sometimes show peculiarities of structure that differentiate them from the later ones, and may make it possible to trace the history of the development of different migratory species, etc. This paper describes the first larval stage of the various generations of *Eriosoma lanigerum*, Hausm., *E. ulmi*, L., *E. ulmosedens*, Marchal, and *E. lanuginosum*, Hartig.

CHIFFLOT (J.) & GAUTIER (C.). **Une myiase nouvelle des variétés de** *Begonia semperflorens*, **Link et Otto, causée par** *Pegomyia bicolor*, **Wied. (Diptères, Anthomyidae.)**—*Rev. Path. vég. & Ent. agric.*, xi, no. 1, pp. 67–69, 3 figs. Paris, January-March 1924. [Received 5th September 1924.]

The larvae of *Pegomyia bicolor*, Wied., caused considerable damage in 1923 by mining in the leaves of *Begonia* seedlings in the Botanical Gardens at Lyons, leaving transparent areas where they fed. When mature, the larvae made an exit hole in the epidermis and dropped to the ground for pupation, which also occurred occasionally within the leaf. One leaf after another might be attacked by the larvae. This seems to be the first record of such injury by this species to *Begonia*. The remedy adopted was to watch the plants night and morning and to crush the larvae within the leaf as soon as their presence was evident.

FAURE (J. C.). **Observations biologiques sur** *Bracon glaphyrus*, **Marsh.**—*Rev. Path. vég. & Ent. agric.*, xi, no. 1, pp. 70–72. Paris, January-March 1924. [Received 5th September 1924.]

Biological notes are given on *Bracon glaphyrus*, Marsh., one of the parasites of *Baris laticollis*, Marsh., and of *B. chlorizans*, Germ. [*cf. R. A. E.*, A, xi, 399, 471].

The pupae of this Braconid are found early in October in the roots of cabbage. As the whole larval life of *B. laticollis*, which is thought to be the normal host, is passed in the ground, the female of *B. glaphyrus* presumably descends into the soil for oviposition, and in this case, where it is an external parasite of a subterranean host, it has only one generation in a year; where, however, the larvae of *B. chlorizans*, which live above-ground, are infested, there are two generations annually. It was noticed that the parasite was more abundant in light soils.

PAILLOT (A.), FERRIÈRE (C.) & FAURE (J. C.). **Note préliminaire sur les Parasites des** *Apanteles* **hôtes de** *Pieris brassicae*, **L., dans la région de Lyon, en 1923.**—*Rev. Path. vég. & Ent. agric.*, xi, no. 1, pp. 78–85. Paris, January-March 1924. [Received 5th September 1924.]

While *Apanteles* spp. are generally considered to parasitise about 50 per cent. of the caterpillars of *Pieris brassicae*, L., it was noticed during a rather severe outbreak of the latter in the Lyons district in 1923 that only about 5 per cent. of the larvae were accounted for in this way. It was found that the reduced effectiveness of the parasite

was due to the work of hyperparasites, the chief species found in 1923 being the Ichneumonids, *Pezomachus nigritus*, Först.; *Hemiteles areator*, Grav., which has been obtained from a number of insects, chiefly Coleoptera and Lepidoptera, being sometimes a primary parasite and sometimes a hyperparasite; *H. fulvipes*, Grav., the most abundant parasite of *Apanteles*; and *H. submarginatus*, Bridg.; and the Chalcids, *Eurytoma appendigaster*, Dalm.; *Psilocera obscura*, Wlk., of which only one individual was obtained; *Pteromalus variabilis*, Ratz., a common parasite of *Apanteles* in 1923, and frequently obtained from Lepidoptera, both as a primary and a secondary parasite; *Catolaccus ater*, Ratz.; *Arthrotylus* sp., perhaps only a dark variety of *A. punctatus*, Thoms.; *Dibrachys boucheanus*, Ratz.; and *Tetrastichus vinulae*, Ratz., very common in 1923. Notes are given on the systematic characters and biological peculiarities of these species.

Willaume (F.). **Observations biologiques sur la nymphose de** *Agriotes obscurus*, **L.**—*Rev. Path. vég. & Ent. agric.*, xi, no. 1, pp. 86–92, 3 figs. Paris, January-March 1924. [Received 5th September 1924.]

Details additional to those of other investigators [*R. A. E.*, A, v, 172; xi, 72] regarding the pupation of *Agriotes obscurus*, L., are given.

Janisch (E.). **Ueber die Verschleppung tierischer Schädlinge durch den Schiffsverkehr.** [The Carriage of Animal Pests by Maritime Traffic.]—*Die Naturwissenschaften*, xii, no. 34, pp. 688-690, 2 figs. Berlin, 22nd August 1924.

A few cases are cited of the introduction of insect pests by sea in order to impress the public with the importance of giving every assistance to the German Plant Protection Service.

Morstatt (H.). **Preliminary Checklist of "common names" used in applied Entomology.**—*Suppl. Entomologica*, no. 10, 56 pp. Berlin, 1st August 1924.

This is a list of the popular names of many injurious insects, mostly in English and French, but with a few Dutch and Italian ones. The corresponding scientific name is given in each case, with the order and family. The list is purely a preliminary one; and economic entomologists are asked to examine, correct and extend it, for which purpose copies will be sent on request. Communications should be addressed: Das Deutsche Entomologische Institut, 20 Gossler-Strasse, Berlin-Dahlem.

Trappmann (W.). **Erprobte Mittel gegen tierische Schädlinge.** [Tested Substances for combating Insects.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugbl. 46, 8th edn., 8 pp. Berlin, August 1924.

This is an annotated list of sprays, dusts, fumigants, washes, baits and repellents. The formula is given in each instance. There is also a list of various pests that occur in Germany with indications of the appropriate remedy in each case.

HASE (A.). **Untersuchungen und Beobachtungen über die Gespinste und über die Spinntätigkeit der Mehlmottenraupen,** *Ephestia kühniella*, **Zell.** [Researches and Observations on the Webs and on the Spinning of the Meal Moth Caterpillars.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiii, no. 2, pp. 79–128, 10 plates. Berlin, July 1924.

In planning chemical or mechanical measures against pests it is necessary to reckon with the natural protection they possess. Many insect pests of importance in Germany produce webs, either in the form of threads or cocoons, and these become of increasing importance in view of the increased employment of fumigation. In these investigations the meal moth, *Ephestia kühniella*, Zell., was used because it is a very important pest; it is typical of a group in which the larvae are spinners, it can be bred easily throughout the year, its size is suitable for experimental work, and, finally, because fumigation is already used on a large scale against it in practice.

The various chapters deal very fully with the spinning apparatus of the larva; the silk, webs and cocoons produced; and the incorporation of foreign materials in the webs, this being a matter of considerable economic importance, as it often involves large quantities of foodstuffs.

VOELKEL (H.). **Zur Biologie und Bekämpfung des Khaprakäfers,** *Trogoderma granarium* **Everts.** [A Contribution to the Biology and Control of the Khapra Beetle.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiii, no. 2, pp. 129–171, 3 pls. Berlin, July 1924.

First reported in Germany in 1921, *Trogoderma granarium*, Everts, occurred in 1923 in numbers in the malt stores of a brewery in north-western Germany. The following data were obtained from this material, all at temperatures of 25°C. [77°F.], unless otherwise stated.

The young adult remains for a period of from several hours to 10 days within the last larval skin that enclosed the pupa. The adult does not feed. Mating may begin immediately on emergence, but is greatly influenced by temperature. Oviposition begins 5–6 days after mating and continues until the female is 24 days old. The largest number of eggs laid on one day was 26, while the maximum laid by a female during her life and at 30°C. [86°F.] was 126. As a rule 65 eggs are laid at the latter temperature.

The young larva feeds on the floury débris resulting from the feeding of the older larvae, because it cannot attack entire grains. Malt and wheat are the preferred foods, rye, oats, rice, maize, etc., being eaten as well. Animal food is not refused. Pupation occurs on the 42nd day after hatching.

The optimum temperature for *T. granarium* lies between 32° and 36°C. [89·6° and 96·8°F.] The number of sterile eggs increases rapidly below 77°F. and above 96·8°F. At temperatures under 8°C. [46·4°F.] the larvae become torpid, but they can resist a temperature of 2-4°C. [35·6–39·2°F.] without any ill-effect. A temperature of −10°C. [14°F.] was resisted for 72 hours by 89 per cent. of the larvae. Repeated cooling to this temperature killed a larger percentage (73 per cent.).

As regards control the best results are obtained with strong concentrations of Zyklon, tetrachlorethane and chloropicrin used for a long time at temperatures over 77°F. Boards, sacks, etc., may be used as

traps and should be burned. At high temperatures, such as occur in malt stores, larvae seek to climb on rough surfaces, where they remain quite still. The following method, based on this fact, is recommended. Wooden laths are suspended horizontally over the heap of grain or malt at a height of about 3 feet. To these laths are fastened sheets of rough cloth, the lower edges of which are in contact with the grain. The larvae will climb on to the material. Every 8 days (or every 2nd day in case of a very severe infestation) these cloths are removed and thrown into boiling water ; they are then hung up again, the high temperature of the stores sufficing to dry the material.

JANISCH (E.). **Ueber die experimentelle Beeinflussung der Lebensdauer und des Alterns schädlicher Insekten.** [On the experimental Influencing of the Longevity and Ageing of injurious Insects.]— *Arb. Biol. Reichsanst. Land- u. Forstw.*, xiii, no. 2, pp. 173–196, 5 figs. Berlin, July 1924.

It is known that on reaching a certain " critical " age adult insects become incapable of reproduction. The experiments described here prove that exposure to weak concentrations of carbon dioxide result in an artificial ageing of female meal moths [*Ephestia kühniella*] so as to prevent mating and oviposition. The strength of CO_2 required is so low that all the plant of a flour mill could be kept working in an atmosphere containing the gas. This must lead to a decrease of infestation. It is necessary to test this method in practice.

WILKE (—). **Der Insektensommer 1924.** [Insects in the Summer of 1924.]— *Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 9, p. 64. Berlin, 1st September 1924.

Only the popular names of the insects recorded are given. In the Rhine provinces the caterpillars of the apple web moth, *Hyponomeuta malinellus*, did considerable injury in some localities, while those of *Tortrix viridana* attacked oaks in many parts of Germany. The winter moths, *Cheimatobia brumata* and *Hybernia defoliaria*, *Nygmia phaeorrhoea*, *Malacosoma neustria*, and *Porthetria dispar* all attacked fruit trees to a marked degree. The caterpillars of *Panolis flammea* ravaged pinewoods throughout Germany, while those of *Charaeas graminis* became in May and June a serious pest of grasses near Berlin. *Chlorops* sp. severely attacked barley in the island of Rügen, and *Phorbia brassicae* and *Anthomyia radicum* destroyed young cabbage plants. *Pegomyia hyoscyami* did marked damage to beet in Silesia and Pomerania. In some places winter crops were destroyed by *Hylemyia coarctata* and the Hessian fly, *Mayetiola destructor*. Rape in one district was so heavily attacked by the rape-beetle, *Meligethes aeneus*, that the fields had to be ploughed up. Gooseberry bushes were frequently defoliated by the larvae of the first generation of *Pteronus ribesii* throughout Germany ; the second generation sometimes did similar damage and also often defoliated currants.

Die Bekämpfung des Kartoffelkäfers. [Work against the Potato Beetle.]— *Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 9, pp. 68–70. Berlin, 1st September 1924.

For financial reasons the projected Imperial law against the Colorado potato beetle [*Leptinotarsa decemlineata*] cannot be passed, and action

must be taken by the individual German States. In order to ensure uniformity, the Minister for Food and Agriculture has published the principles on which the regulations should be based. They aim at the eradication of the pest immediately it is observed; combative measures are only to be adopted if eradication fails. The Prussian Ministry of Agriculture has published a preliminary edict, and the resultant police regulations issued include a provision by which all gardens and agricultural land are laid open to official inspection whenever required.

RAMBOUSEK (—). **Neue Rübenschädlinge.** [New Pests of Beet.]—*Zeitschr. Zuckerind. tschechoslowak. Republik,* xlviii, pp. 141–144, 1924. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes,* 1924, no. 2, p. 12. Vienna, 1924.)

Meloid beetles are reported as attacking sugar-beet in Czecho-Slovakia. Against them and also against weevils the measures advised are either collection in wet weather, early in the morning or late in the evening, or spraying with barium chloride. Cerambycid beetles of the genus *Dorcadion*—*D. aethiops*, Scop., *D. fulvum*, Scop., and *D. pedestre*, Poda —may do appreciable injury and should be combated with sprays of barium chloride or arsenicals and by protective trenching.

BONDAR (G.). **Vaquinhas do cacaoeiro.** [Beetles infesting the Cacao Tree.]—*Correio-agricola,* ii, no. 7, pp. 204–209, 4 figs. Bahia, July 1924.

The following are the chief beetle pests of cacao in Bahia: The Eumolpids, *Nodonota theobromae*, Bryant, which skeletonises the tenderest leaves and destroys the shoots, *Colaspis trivialis*, Boh., skeletonising young leaves but not killing the shoots, and *C. flavicornis*, F., found in small numbers throughout the cacao districts; the Halticid, *Homophyla adusta*, Har., feeding on the young leaves; and the Cassidids, *Omoplata nigrolineata*, Boh., which does little harm, and *Hemisphaerota* sp., which feeds on the leaves but is of no economic importance. *N. theobromae* and *C. trivialis* require combating, but as the larvae are unknown the only measure advised is collection by jarring early in the morning or in the evening.

A. A. **A praga dos cafesaes paulistas.** [The Pest of Coffee Plantations in S. Paulo.]—*Correio-agricola,* ii, no. 7, pp. 217–218. Bahia, July 1924.

The African Scolytid, *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.), introduced into the Brazilian State of S. Paulo about 5 years ago, has severely attacked some 2 million coffee bushes, while another 36 million are also more or less infested. Drastic measures have been taken by the State and Federal Governments, but it has been found that plantations in S. Paulo are in better condition, as regards infestation, than those of Java and Sumatra, owing to the pest suffering from the cold season that occurs in S. Paulo and the lack of the very hot season found in the Dutch East Indies.

Tutt (E. L.). **Los perjuicios causados por la Lagarta rosada.** [The Losses caused by the Pink Boll Worm.]—*Minist. Agric. de la Nación*, Circ. 292, 3 pp. Buenos Aires, 28th July 1924.

The losses caused in various countries by the pink bollworm [*Platyedra gossypiella*], which occurs throughout the cotton areas of Argentina, are briefly reviewed, and the injuries due to its infestation of cotton are enumerated.

Instrucciones para el empleo de las sales arsenicales contro diversas plagas de la agricultura. [Instructions for using Arsenical Salts against various Pests of Agriculture.]—*Minist. Agric. de la Nación*, Circ. 293, 8 pp., 2 figs. Buenos Aires, 29th July 1924.

This circular contains no new information. The formulae for the different arsenical insecticides are given, with instructions for their use against various pests occurring in Argentina.

Winters (N. E.). **Desinfección de la semilla de algodonero.** [The Disinfestation of Cotton Seed.]—*Minist. Agric. de la Nación*, Circ. 294, 1 p. Buenos Aires, 31st July 1924.

The destruction of the pink bollworm [*Platyedra gossypiella*] in cotton seed by fumigation with carbon bisulphide is described.

Felt (E. P.). **Manual of Tree and Shrub Insects.**—8vo, xxvi+382 pp., 256 figs. New York, Macmillan Co., 1924.

The author presents a concise and practical summary of the insect problem in its relation to both forest and shade trees in North America. Part i contains general biological notes on insects, with a list of wood-boring and leaf-feeding species introduced into the United States, and a bibliography of the principal American publications. Remedial measures and natural factors tending to check insect increase are also discussed. Further sections deal with insects attacking shade and ornamental trees, forest insects, and the commoner species and groups found in woodlands, with their relations to each other. In each section keys are given to facilitate identification of the various insects, groups, galls, etc. The volume is supplied with clear text figures and a comprehensive index.

Venables (E. P.). **Leaf-rollers attacking Orchard Trees in the Okanagan Valley.**—*Proc. Ent. Soc. Br. Columbia*, no. 21, pp. 22–27. Vancouver, B.C., 1924.

Prior to 1918 injury caused by leaf-roller larvae was generally attributed to *Tortrix* (*Cacoecia*) *rosaceana*, Harr., the presence of *T.* (*C.*) *argyrospila*, Wlk. (fruit-tree leaf-roller) in the Okanagan Valley being doubtful at that time. Now, however, four Tortricids are recorded from this district. During 1923 *T. argyrospila* spread throughout the whole of the orchard sections of the valley. Its life-history is briefly described, with recommendations for its control

[*cf. R.A.E.*, A, ix, 164]. The eggs hatch in May, just as the buds begin to expand. Pupation occurs in July ; the moths emerge towards the end of that month and have practically all disappeared by early August. Where oil sprays are not used against the overwintering eggs, lead arsenate may be applied after the larvae have hatched, thorough covering and high pressure sprays being essential for the control of these leaf rollers.

T. rosaceana (oblique-banded leaf-roller) has also become more abundant. It was generally believed that its life-history was more or less identical with that of *T. argyrospila*, but recent observations have shown this to be erroneous. *T. rosaceana* passes the winter in the Okanagan Valley as a partly-grown caterpillar on the trees within a closely-woven silken cocoon. The cocoons may be found under flakes of dead bark, under bud scales, attached to fruit spurs, or in other protected situations. The larvae emerge in early spring, as soon as the buds begin to expand, and feed much in the same manner as those of *T. argyrospila*. Adults are on the wing about the middle of July, during which month the eggs are laid on the upper surface of the leaves of apple and other orchard trees. The newly hatched larvae migrate to the lower surface of the leaves, where they spin silken webs close to the main veins. They feed in this position until they enter their hibernation quarters. A leaf may also be attached to an apple, the larvae feeding on the surface of the fruit and causing injury identical with that of *Eucosma* (*Tmetocera*) *ocellana*, Schiff. (bud moth). Arsenical sprays as applied for *Tortrix argyrospila* should prove effective against *T. rosaceana*. The possible value of summer sprays against the newly hatched larvae requires further experiments.

T. alleniana, Fern., was first recorded as an orchard pest from the Okanagan Valley in the summer of 1922. Its life-history and habits greatly resemble those of *T. rosaceana*, though the eggs have also been found on lucerne and snowberry. During the late summer the larvae appear to be somewhat gregarious, three or four being found in the same web under a single leaf. The hibernating cocoons are constructed on the limbs and twigs of the tree during the latter part of July and early August. Pupation occurs within folded apple leaves in the same manner as with other leaf-rollers.

The fourth species, *Peronea maximana*, B. & B., was reported from the terminal shoots of apple during the early summer of 1920, and beyond the fact that the adults from these larvae developed in August and September, nothing is known about its life-history. According to E. H. Blackmore, it is more or less common on Vancouver Island and in some seasons extremely common at Fraser Mills, in the lower Fraser Valley, in September and October ; the larvae are supposed to feed on elder.

GLENDENNING (R.). **The Elm-Currant Aphis** (*Eriosoma ulmi*, **L.**).—*Proc. Ent. Soc. Br. Columbia*, no. 21, pp. 33–40, 12 figs. Vancouver, B.C., 1924.

A key is given to the 5 species of *Eriosoma* occurring on elm in Canada. Of these *E. ulmi*, L., has been introduced from Europe comparatively recently. The eggs are laid in the autumn on the trunk of English elm (*Ulmus campestris*) and hatch during the latter half of April. The emerging larvae crawl to bursting buds and remain on

the lower side of a young leaf until death. These individuals become the stem-mothers. The leaves on which they feed curl, forming a pseudo-gall and thus affording a certain amount of protection to the insects. About 50 young are deposited by each stem-mother; these become winged and leave the elm early in June, thus differing slightly from *E. lanigerum*. These migrants of *E. ulmi* fly to black currant or gooseberry, such infestations having been found at a distance of 2 miles from any elms. On the currant they travel down the stem into the ground to a depth of 1–4 inches, where 12–15 young are deposited by each individual. These become the first generation of the wingless root Aphids, which gradually colonise the whole root system, penetrating to a depth of 3 feet and often occurring 5 feet from the stem. No complete series was reared, but it would appear that from 5 to 6 root generations occur during the summer in British Columbia. Early in September nymphs may be found in the soil; the winged migrants emerge from these in large numbers about the middle of September, scattered emergence being noticed right into the middle of October. These migrants fly back to the English elm, where they deposit the sexual forms. They are most abundant at a height of from 5 to 7 feet from the ground, just below the main branches. The sexual forms live for about a week hidden in the crevices of the bark and in the damp moss of the trunk. The eggs are deposited in this position.

Though recorded as causing considerable damage to young currants in England, *E. ulmi* has so far not proved to be of serious economic importance in America. The best time for combating the species on elm is when the autumn migrants are clustered on the trunks. One application of nicotine sulphate would destroy a large number of these migrants, while two applications, with an interval of ten days, would probably give complete control. Experiments were conducted during 1921 with various soil insecticides for the control of the root forms; this treatment, however, proved to be economically impossible for small fruits. A heavy dressing of crude naphthaline (six handfuls to each bush, hoed in to a depth of 2–3 inches) appears, however, to be satisfactory as a deterrent.

GLENDENNING (R.). **Preliminary List of Aphididae of British Columbia.** —*Proc. Ent. Soc. Br. Columbia*, no. 21, pp. 40–43. Vancouver, B.C., 1924.

Fifty-two species are included in this list, grouped under the tribes and subtribes, with brief notes on the food-plants.

MCDANIEL (E. I.). **The Potato-beetle Destroyer,** *Perillus claudus*.— *Qtrly. Bull. Michigan Agric. Expt. Sta.*, vi, no. 4, pp. 185–186, 1 fig. East Lansing, Mich., May 1924. [Received 3rd September 1924.]

The Pentatomid, *Perillus claudus*, is one of the most important predacious enemies of the Colorado potato beetle [*Leptinotarsa decemlineata*] in its original home, about the eastern foothills of the Rocky Mountains, and has gradually spread eastward with it. There are two distinct forms of it, one black and brown and the other black

and orange. They pass the winter as adults in protected places (sometimes in houses), from which they emerge in the spring. Small, dark eggs are placed on the lower surface of the leaves, beside the golden-yellow eggs of the potato beetle. The young bugs at first feed on the eggs of the potato beetle and later attack the immature stages. When the supply of potato beetles is exhausted, the bugs are able to subsist on other insects until the preferred host appears again. For the last 20 years this bug has kept *L. decemlineata* in check in Michigan ; the arsenical sprays used to control the beetle do not destroy the bug.

WATSON (J. R.). **Insect Enemies of the Potato in Florida.**—*Florida Agric. Expt. Sta.*, Bull. 169, pp. 149–163, 14 figs. Gainesville, Fla., December 1923. [Received 3rd September 1924.]

A brief account is given of the chief insect pests (under their popular names only) of the potato in Florida, with suggestions for their control.

HEADLEE (T. J.). **The Fight against the Gipsy Moth in New Jersey.**—*Jl. Econ. Ent.*, xvii, no. 4, pp. 438–440. Geneva, N.Y., August 1924.

The results of the work against *Porthetria dispar*, L. (gipsy moth) in New Jersey and the expenditure entailed are briefly reviewed. The 850 colonies found in 1920–21 were reduced to 98 in 1922–23, and the original area of infestation of 500 sq. miles to about 250. The gipsy moth problem cannot be considered from the standpoint of one State alone ; should it be exterminated in New Jersey reinfestation is certain to occur unless adequate precautionary measures are maintained and sources of likely infestation suitably dealt with.

DAVIS (J. J.). **Status of Hydrocyanic Acid Gas Treatment of Nursery Stock.**—*Jl. Econ. Ent.*, xvii, no. 4, pp. 440–443. Geneva, N.Y., August 1924.

A summary is given of serious complaints from nurserymen and owners of orchards relative to injury to nursery trees when fumigated with hydrocyanic acid gas, and of the factors involved. Nearly all admitted the effectiveness of the fumigation in destroying scale-insects and that it was probably harmless to trees that were perfectly dry at the time of treatment, but stated that it was impossible always to have the trees in the right condition for fumigation. The need of further experiments with the gas and additional materials and probable plans for such investigations are suggested.

SASSCER (E. R.). **Important Foreign Insect Pests Collected on Imported Nursery Stock in 1923.**—*Jl. Econ. Ent.*, xvii, no. 4, pp. 443–444. Geneva, N.Y., August 1924.

A preliminary list is given of the more important insects intercepted on foreign nursery stock arriving in the United States in 1923. A complete list will be published elsewhere by the Federal Horticultural Board.

HAMLIN (J. C.). **Biological Control of Prickly-Pear in Australia : Contributing Efforts in North America.**— *Jl. Econ. Ent.*, xvii, no. 4, pp. 447–460, 2 pls. Geneva, N.Y., August 1924.

The introduction from North America of natural enemies of Australia's introduced prickly pear pest has been in progress for about three years [*R. A.E.*, A, vii, 481 ; ix, 565 ; x, 415 ; xii, 373, etc.]. This paper records the methods of rearing, packing and shipping the insects and the equipment employed in this special work. A list is given of the insects, the number of times sent and the number of individuals consigned. A great number of these have already been noticed ; others are a bug, *Narnia pallidicornis*, and a Pyralid, *Noctuelia elautalis*, from Texas. The relation of the North American work to that in Australia is summarised, and notes are given on several important insects from Mexico, as well as a statement of the cactus diseases dealt with.

The time of year when the shipments are sent is one of the most important factors in the establishment of North American insects in Australia, as those despatched in the summer or winter are immediately subjected to reversed seasons upon arrival in the Southern Hemisphere, thus rendering establishment more difficult. The change of season would appear to be the most satisfactory time ; thus a given generation having passed through an American summer would, if shipped in the autumn, continue through the summer conditions in the tropics and reach Australia at the beginning of the Australian summer. Owing to the passage through the tropics, the winter conditions cannot be prolonged in the same manner by shipping in spring ; the most favourable period for shipment from the southern United States is, therefore, from September to December.

All of the 16 species feeding on healthy prickly pear and the 7 scavenging species, which assist the plant feeders by extending the initial injury, have reached Australia alive. None of the latter have become established, owing to the inability of both American and Australian laboratories to rear them in captivity. Of the 16 primary feeders the midge, *Asphondylia opuntiae*, and the fruit worm, *Noctuelia elautalis*, have failed to breed in captivity, four weevils of the genus *Gerstaeckeria* have been eliminated on account of their unimportant injury, and *Dactylopius confusus* refuses to feed on the common Australian pest pears. Of the remaining species 6 have increased in a satisfactory manner. Almost the entire present Australian effort relating to biological control of the prickly pear is based on the field and laboratory work in the United States, and the North American work was planned to cease in May or June 1924 ; provision should therefore be made to secure from Mexico and South America other valuable cactus destroyers. By this means several other natural enemies of the prickly pear would be available to strengthen the reduced complex already introduced from North America.

BLACKMAN (M. W.). **The Effect of Deficiency and Excess in Rainfall upon the Hickory Bark Beetle** (*Eccoptogaster quadrispinosus*, **Say**). —*Jl. Econ. Ent.*, xvii, no. 4, pp. 460–470, 1 fig. Geneva, N.Y., August 1924.

An outbreak of *Scolytus* (*Eccoptogaster*) *quadrispinosus*, Say (hickory bark beetle) started in Syracuse in 1912, and has lasted to the present time, with a decided check in 1915. It was preceded by semi-drought

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conditions for several years, and, while the trees were undoubtedly affected, it is evident that the weakened condition of the tree is not sufficient to account for the rapid increase in the number of the beetles and the resulting increase in the trees killed. Apparently an abnormality in precipitation during the months of June, July and August would have a decided direct effect upon the insects themselves. *S. quadrispinosus* passes the winter as a fully grown larva in the outer portion of the inner bark. At Syracuse the adults emerge from the latter part of June up to early in August. They fly at once to living hickory trees and feed by boring into the young twigs and the bases of the leaf petioles. After feeding for some time the female selects a suitable place on the trunk or branches, such as one of the longitudinal cracks or under one of the loosened scales, and begins to construct the burrow in which the eggs are laid. An excess of precipitation at this time would destroy large numbers of these insects. The author is of opinion that rainfall not only exerts this direct influence on the adults, but also, indirectly, through its effect on the tree, affects, perhaps even to a greater extent, both adults and larvae. The effect of cloudy weather is an excess in the moisture content of the tree, resulting in a swelling or turgidity of its component living tissues. Borings through the living tissues of a tree in wet cloudy weather would, therefore, release more moisture than during a dry period of much sunshine. The mortality of the larvae and adults in the moist burrows is greater than under dry conditions. Should this hypothesis be established by future observations, it would appear to be of great practical value, since if it is known that a period of deficiency in rainfall weakens the resistance of the trees and at the same time favours the development of certain pests, an incipient outbreak might be controlled before it became serious.

Tietz (H. M.). **The Solubility of Arsenate of Lead in the Digestive Fluids of the Honey Bee** (*Apis mellifica*).—*Jl. Econ. Ent.*, xvii, no. 4, pp. 471–477. Geneva, N.Y., August 1924.

The following is the author's abstract of this paper: The purpose of this study was to find out how the solubility of lead arsenate is increased by the action of the digestive fluids present in the alimentary tract of an insect. In making these determinations, the honey-bee, *Apis mellifica*, L., was taken as the insect, and the solubility of lead arsenate powder in water was taken as the unit of solubility. The conclusions drawn from these experiments are as follows: The solubility of lead arsenate does not seem to increase when the powder is acted upon by the fluids in the oesophagus. The digestive secretions of the honey stomach and stomach render the poison at least $1\frac{1}{4}$ times as soluble. The action of the intestinal juices is to throw at least $3\frac{3}{4}$ times as much of the powder in solution as would be dissolved by water alone.

Nickels (C. B.). **Results secured from Late Season Applications of Calcium Arsenate Dust, for the Control of the Cotton Boll Weevil.**—*Jl. Econ. Ent.*, xvii, no. 4, pp. 477–480. Geneva, N.Y., August 1924.

The following is the author's abstract of this paper: The cotton boll weevil (*Anthonomus grandis*, Boh.) causes severe damage to late fruiting crops after the beginning of migration. Serious injury

(causing poison to be required) did not occur in the majority of fields until 19th August, or later. The average increase in yields of seed cotton resulting from the use of calcium arsenate dust on comparable plots was 236 lb. per acre. The average expense of using the calcium arsenate dust method was the cost of 29·27 lb. of calcium arsenate and 3·6 hours of labour.

Drake (C. J.), Fenton (F. A.) & Butcher (F. D.). **The Importance of the Flaxseed Count in predicting the actual Fly-free Date.**—*Jl. Econ. Ent.*, xvii, no. 4, pp. 480–486, 3 figs. Geneva, N.Y., August 1924.

The following is the authors' abstract of this paper: The period of emergence of either the autumn or spring brood of Hessian flies, *Mayetiola* (*Phytophaga*) *destructor*, Say, varies from year to year with bioclimatic conditions. On this account "fixed" or "approved" dates are unreliable, and the seeding date each year should be correlated with the season and with the autumn brood of flies. In Iowa, the flaxseed (puparia) count has been the only constant and reliable factor to use in predicting accurately the actual fly-free date. One hundred or more flaxseeds were collected at each station each day (average about 1,000 a day at Monona county station) from old stubble dug at random in heavily infested fields. These flaxseeds were then classified as parasitised, empty and viable. The viable flaxseeds were then dissected to determine the percentage of larvae, of pupae and of parasitised larvae. Hence the flaxseed count gave the daily rate of transformation from the larva to the pupa and to the adult state, as well as the rate of approach of the fly-free date. When this count yields very few pupae and only a small percentage of larvae in contrast to a large number of empty flaxseeds, it is proof that the actual fly-free date is at hand, and that the few remaining pupae will immediately issue as flies, lay their eggs and perish before wheat drilled at this time will come up. Thus it is possible to predict the fly-free date, so that farmers can begin drilling wheat 6 or 7 days before the end of the egg-laying period of the autumn brood of flies. The records of the Iowa Observation Stations for 1922 and 1923 are given in the form of a summary.

Siegler (E. H.) & Baker (H.). U.S. Bur. Ent. **Parasitism of Scales —San José and Oyster Shell.**—*Jl. Econ. Ent.*, xvii, no. 4, pp. 497–499. Geneva, N.Y., August 1924.

From twigs infested with *Aspidiotus perniciosus*, Comst. (San José scale) sent to the Maryland laboratory the following parasites were reared: *Prospaltella perniciosi*, Tow., *Signiphora pulchra*, Gir., *Perissopterus* sp., *Ablerus clisiocampae*, Ashm., *Aphelinus fuscipennis*, How., and *A. mytilaspidis*, LeB. The last named was the only species reared also from *Lepidosaphes ulmi*, L. (oyster-shell scale). A table is given showing the number of each of the parasites reared and the place at which they were collected. *Prospaltella perniciosi* appears to be the only species that was present in any appreciable number. The percentage of parasitism of *A. perniciosus* for each locality from which twigs were received varied from 0 in Georgia to 6·01 in Indiana. In the case of *L. ulmi* the percentage was 2·16 (Illinois).

DE ONG (E. R.) & WHITE (L. T. W.). **Further Studies of Derris as an Insecticide.**—*Jl. Econ. Ent.*, xvii, no. 4, pp. 499–501. Geneva, N.Y., August 1924.

Various species of *Deguelia* (*Derris*) occurring in the Philippines have been tested by H. E. Woodworth for their insecticidal properties, and brief data from his experiments are tabulated. In experiments with the commercial extract of 16 per cent. concentration, a dilution of 1 to 500 killed 13 per cent. of *Aphis nerii*, Boy., and 50 per cent. of *Myzus* (*Rhopalosiphum*) *persicae*, Sulz. (green peach Aphid). Dilutions of 1 to 300 killed 68 per cent. of *M. persicae* and 25 per cent. of *Tetranychus telarius*, L. (red spider). Undiluted powdered root killed all Aphids in 8 hours, and 98 per cent. of the larvae of the Nymphalid, *Euphydryas chalcedona*, Dbl. & Hew., when dusted on the leaves on which they were feeding. It is therefore concluded that the active principle of "derris" is both a stomach and respiratory or tracheal poison. The fumigating action of the commercial extract was close to that of the toxicity curve for spraying. A comparative test on pyridine as a fumigant gave an efficiency of 3·8 per cent.

DODDS (C. T.). **A Pecan Case-bearer.**—*Jl. Econ. Ent.*, xvii, no. 4, p. 504. Geneva, N.Y., August 1924.

Acrobasis nebulella, Riley, has been introduced into California from Florida on pecan trees. Efforts are being made to eradicate the pest before it becomes established, as it is possible that it might attack English walnuts. Adults were found emerging during the second week in June.

ALLEN (H. W.). **An Infestation of *Autographa biloba*, Steph., on Lettuce.**—*Jl. Econ. Ent.*, xvii, no. 4, p. 504. Geneva, N.Y., August 1924.

The larvae of *Phytometra* (*Autographa*) *biloba*, Steph., caused extensive defoliation of lettuce in a cold frame in Mississippi. Lettuce in the garden less than 100 feet distant remained untouched. This appears to be the only occurrence of the moth in the locality. No parasites were reared, but some of the larvae showed symptoms of polyhedral disease.

WATSON (J. R.). **Report of the Entomologist.**—*Florida Agric. Expt. Sta., Rept. 1922–23*, pp. 103–113 R. [Gainesville, Fla., 1923.] [Received 3rd September 1924.]

The study of thrips in citrus groves has largely confirmed the findings of the previous year [*R. A. E.*, A, xi, 503]. An average of 25 thrips to the bloom is sufficient to spoil the appearance of much of the fruit; a larger number would be dangerous to grapefruit and a smaller one to tangerines. If Spanish needle (*Bidens leucantha*) is present in the groves, spraying is useless, as re-infestation from this weed will promptly follow. Smooth-skinned varieties of orange are more susceptible to scarring, and the extent of damage was found to vary greatly in different areas of the citrus belt. High-power dusting against thrips is not successful, as it is impracticable to fill each blossom cluster in this manner, but for thrips on the low-growing satsuma trees dusting with a bellows type of hand duster, using dusts of nicotine sulphate and lime, was both practical and economical. The distribution of *Frankliniella tritici bispinosa*, Morg. (Florida flower thrips) was found

to coincide closely in its western range with the western boundary of Florida.

Against rust mites [*Eriophyes oleivorus*, Ashm.] dusting was quite as effective as spraying, while the cost was less than one-third. Against mealybugs [*Pseudococcus* spp.] oil emulsions were not very satisfactory; lime-sulphur, applied at a pressure of at least 250 lb., penetrated better. A 1 per cent. solution of carbolic acid, kerosene emulsion 1 : 15, and a solution of 1 U.S. quart nicotine sulphate with 6 to 8 lb. soap per 200 U.S. gals. water, all gave good results. The most effective check on the mealybugs was the predacious caterpillar of the Pyralid, *Laetilia coccidivora*, Comst., a number of which have been sent to California in exchange for the predatory Coccinellid, *Scymnus binaevatus*, Muls. The Dipterous parasite, *Tanaomastix* (*Paraleptomastix*) *abnormis*, Gir., introduced from California several years previously, has been found 8 miles from the place of liberation, and scarcity of mealybugs in the groves indicates its efficiency. The Coccinellid, *Delphastus* [*catalinae*, Horn.], introduced against whiteflies, has proved of great value, but seems to require the presence of both the citrus whitefly [*Dialeurodes citri*, Riley & How.] and the cloudy-winged whitefly [*D. citrifolii*, Morg.] in order to live. It feeds on the eggs and young larvae, and the presence of both species gives it a more steady food supply, as their swarming periods are different. Aphids were sufficiently numerous in many citrus groves to render spraying necessary.

A new development of thrips injury in the spring was that of heavy damage to snap beans. The method of reducing the root-knot Nematode [*Heterodera radicicola*, Greef] by sowing bush velvet-beans [*R. A. E.*, A, xi, 197] has surpassed all expectations. The field must be kept absolutely free from weeds and grass. In seed-beds, where a thorough and more rapid destruction of the Nematode is required, fumigation is recommended [*R. A. E.*, A, xi, 504]. Late celery was much damaged by *Phlyctaenia rubigalis*, Gn. (*ferrugalis*, auct.) (celery leaf tyer); poisoned bran bait moistened with undiluted nitrobenzene proved the most successful remedy. Another pest of celery was *Halticus citri*, Ashm. (garden flea-hopper), which can be controlled by kerosene emulsion in seedbeds, or, better, by calcium cyanide dust, but the latter should not be used within some weeks of the marketing of the celery. A number of experiments in control of the bean leafhopper [*Empoasca mali*, LeB.], which is the determining factor in successful bean growing in Florida, are reported, and the relative value of dust and liquid sprays is discussed. For dusting, hydrated lime, with 10 per cent. dusting sulphur, impregnated with 2·5 per cent. of nicotine, in the form of nicotine sulphate, gave good results against the nymphs but had little effect on the adults, and quickly became ineffective on exposure to the air and dew. With heavy applications the lime caused some scorching, but kaolin was not so satisfactory as a carrier, as it did not adhere so well and the nicotine did not become so readily available. Bordeaux mixture, to which nicotine sulphate was added, applied by a specially devised arrangement of enclosed nozzles, killed adults as well as nymphs.

Pettit (R. H.). **Common Pests of Field and Garden Crops.**—*Michigan Agric. Expt. Sta.*, Spec. Bull. 132, 60 pp., 40 figs. East Lansing, Mich., March 1924. [Received 3rd September 1924.]

This bulletin deals with a number of the more important pests, giving a short account of each, with suggestions for control. A table is

included showing the computed dates for sowing autumn wheat in the different counties of Michigan in order to avoid infestation by *Mayetiola* (*Cecidomyia*) *destructor*, Say (Hessian fly).

HOWARD (N. F.). U.S. Bur. Ent. **Control of the Mexican Bean Beetle in the Eastern States.**—*Qtrly. Bull. State Pl. Bd. Mississippi*, iv, no. 2, pp. 31–34. A. & M. College, Miss., July 1924.

Epilachna corrupta, Muls. (Mexican bean beetle) has appeared in Mississippi within the last few years, and the use of suitable arsenicals against it is discussed [*R. A. E.*, A, xi, 262 ; xii, 165], with the amount of spray necessary and the type of apparatus recommended.

LYLE (C.). **Destructive Insects Mississippi is guarding against.**—*Qtrly. Bull. State Pl. Bd., Mississippi*, iv, no. 2, pp. 1–30, 24 figs. A. & M. College, Miss., July 1924.

A number of important destructive insects occurring in other parts of the United States have not yet appeared in Mississippi, and a strict quarantine is maintained with a view to keeping them out. A short account is given of the chief of these, with illustrations to enable farmers to recognise them if they should appear.

WEBSTER (R. L.) & AINSLIE (C. N.). U.S. Bur. Ent. **Pale Western Cutworm in North Dakota.**—*N. Dakota Agric. Expt. Sta.*, Bull. 179, 24 pp., 10 figs. Agric. College, N.D., April 1924. [Received 4th September 1924.]

Porosagrotis orthogonia, Morr. (pale western cutworm) has been very injurious to several crops, particularly wheat and maize, in the west of North Dakota during recent years. The damage has been most severe in dry seasons and on the lighter types of soil. An account is given of the seasonal history, the damage done and the conditions favouring infestation [*R. A. E.*, A, x, 111]. A five-year crop rotation is suggested that would reduce damage by this pest to a minimum ; this includes, in the first year, maize or summer fallow or late millet ; in the second, wheat, as a nurse crop for sweet clover ; in the third, sweet clover, pastured or cut for seed ; in the fourth, flax ; and in the fifth, barley, oats or wheat.

WEBSTER (R. L.). **Entomology.**—*Rept. North Dakota Expt. Sta. July 1921–June 1923*, Bull. 174, pp. 45–49, 2 figs. Agric. College, N.D., February 1924. [Received 4th September 1924.]

An account is given of *Porosagrotis orthogonia*, Morr. (pale western cutworm) with suggestions for its control in North Dakota [see preceding paper].

BRUES (C. T.). **The Specificity of Food-plants in the Evolution of Phytophagous Insects.**—*Amer. Nat.*, lviii, no. 655, pp. 127–144. Lancaster, Pa., March-April 1924.

This article continues earlier investigations [*R. A. E.*, A, viii, 459 ; xi, 223] dealing with the change of food-plants of various phytophagous insects and reviewing work done in this connection by other authors.

CURRAN (C. H.). **New Canadian Diptera, with Synopsis of the Genus *Cynorhina*.**—*Canad. Ent.*, lvi, no. 8, pp. 193–196. Orillia, Ont., August 1924.

A new Tachinid, *Eulasiona nigra*, sp.n., reared from larvae of *Tortrix* (*Cacoecia*) *rosana*, is described from British Columbia.

WALKER (G. P.). **Spraying in Relation to the Renovation of Old Orchards in New Brunswick.**—*Proc. Acadian Ent. Soc. 1923*, no. 9, pp. 8–13. Truro, N.S., May 1924. [Received 15th September 1924.]

An experiment has been made in the regeneration of old orchards, which are numerous in New Brunswick and have become badly infested with apple pests. The particular orchard chosen had been very much neglected for many years and had borne no fruit fit for use for 8 years. The chief pests noticed were the green apple bug [*Lygus communis* var. *novascotiensis*, Knight], apple maggot [*Rhagoletis pomonella*, Walsh], bud moth [*Eucosma ocellana*, F.], codling moth [*Cydia pomonella*, L.], green fruit worm [probably *Graptolitha bethunei*, G. & R.], tussock moth [*Hemerocampa*] and tent caterpillars [*Malacosoma*]. More than half the trees were cut out, and the remaining ones were properly pruned ; in the spring the whole orchard was cultivated and fertilised. The spraying programme followed gives 5 sprays, including 2 sprays of sulphur, nicotine-sulphate and calcium arsenate, 1 of Bordeaux mixture and 2 of lead arsenate. In spite of a rather unfavourable season, 234 barrels of apples were obtained in the first year, including 115 barrels of second grade fruit. Observations made a few days before the apples were picked showed that less than 1 per cent. had been injured by *R. pomonella* and about 1 per cent. by *L. communis* var. *novascotiensis*, while an old, untreated orchard about 150 yards distant showed injuries to 100 per cent. and about 90 per cent. respectively.

DUSTAN (A. G.). **Studies on a New Species of *Empusa* parasitic on the Green Apple Bug (*Lygus communis* var. *novascotiensis*, Knight) in the Annapolis Valley.**—*Proc. Acadian Ent. Soc. 1923*, no. 9, pp. 14–36, 3 pls. Truro, N.S., May 1924. [Received 15th September 1924.]

Further details are given regarding *Empusa erupta*, sp.n., infesting *Lygus communis* var. *novascotiensis*, Knight (green apple bug) [*R. A. E.*, A, xi, 477], with particular reference to the work of the last two years. The chief difficulty in artificial dissemination of this fungus is in obtaining sufficient infested material, and the extremely short period over which the fungus may be distributed, that is, when the conidia are being discharged, and while the adults are seeking shelter under the bark. In normal seasons the former period lasts about 10 days, and the latter about a week, the two periods sometimes overlapping. One of the chief aims of future work will be to lengthen the time over which the disease can be spread. This may be done by increasing the number of parasitised green apple bugs by rearing diseased individuals in cages, or by making use of the only other known host, which is an unidentified species of *Plagiognathus*, a small green Capsid that lives throughout the season on apple foliage, wintering in the egg stage in the cambium layer of the twigs, and appearing in the spring as soon as the buds

begin to unfold. Nymphs and adults can be found during the whole season, the latter until late October. There are two generations in a year, both being attacked by the fungus, so that diseased forms, discharging spores, can be found from early summer until mid-September. It is hoped to be able to produce epidemics of this fungus in cages and to start the disease earlier in the season, besides getting more parasitised material for dissemination.

BRITTAIN (W. H.). **The Garden Springtail** (*Sminthurus hortensis*, Fitch) **as a Crop Pest.**—*Proc. Acadian Ent. Soc. 1923*, no. 9, pp. 37–47, 2 pls. Truro, N.S., May 1924. [Received 15th September 1924.]

Springtails, chiefly *Smynthurus hortensis*, Fitch, have been observed doing considerable damage to crops in Halifax, N.S., by cutting through the tender stems of seedling beets, turnips, mangels, etc., or making small holes in the leaves. A number of records of injury by these insects are quoted from previous writers. In an outbreak of springtails on onions in Massachusetts in 1922, nicotine dust (2 or 4 per cent.) was found to kill all the insects, all except the largest being killed almost as soon as the dust touched them. A description of the insect by J. W. Folsom is given, with figures.

WALKER (G. P.). **Insects of New Brunswick injurious to Crops in 1923.**—*Proc. Acadian Ent. Soc. 1923*, no. 9, pp. 48–54. Truro, N.S. May 1924. [Received 15th September 1924.]

The insect pests of crops occurring in New Brunswick in 1923 are listed, with brief notes on each.

SPITTALL (J. P.). **Insects of the Season 1923 in Nova Scotia.**—*Proc. Acadian Ent. Soc. 1923*, no. 9, pp. 55–68. Truro, N.S. May 1924. [Received 15th September 1924.]

This record has been compiled from reports received from members of the Acadian Entomological Society, and gives the localities in which the various outbreaks of insect pests occurred.

GORHAM (R. P.). **Notes on** *Agriotes mancus*, **Say, at Dartmouth, N.S.**—*Proc. Acadian Ent. Soc. 1923*, no. 9, pp. 69–72, 1 pl. Truro, N.S. May 1924. [Received 15th September 1924.]

The larvae of *Agriotes mancus*, Say, occur in large numbers about Halifax, N.S., damaging market garden crops; as many as 15 to 20 of these wireworms may be found at the root of one cabbage plant, or 50 on a single seed piece of potato. The complete life-history has not been worked out, but the development of the larger larvae to adult beetles has been traced. In experimental boxes it was found that these larvae devoured cutworms encountered in the soil and also other wireworms. Ground mustard and synthetic mustard oil were both found to be toxic to the wireworms upon contact. Pupae and young adults in the field were found to be attacked by two species of fungus, one of which has been provisionally identified as *Isaria anisopliae* var. *americana*, while the other belongs to the genus *Tarichium*.

DE GRYSE (J. J.). **The Control of Forest Tent Caterpillars in the Prairie Provinces.**—*Canada Dept. Agric.*, Circ. 19, 4 pp., 1 map, 8 figs. Ottawa, January 1924. [Received 15th September 1924.]

General measures against forest tent caterpillars [*Malacosoma disstria*] are outlined, and suitable machinery for spraying is described and figured.

HUTCHINGS (C. B.). **The Walnut Caterpillar and its Control.**—*Canada Dept. Agric.*, Circ. 21, 4 pp., 4 figs. Ottawa, March 1924. [Received 15th September 1924.]

Datana integerrima, G. & R. (walnut caterpillar), which is more or less prevalent throughout southern Ontario, was particularly troublesome to walnut and hickory in 1923. Its food-plants, habits and the methods for its control are the same as those recorded for the United States [*R. A. E.*, A, vi, 457]. Against the older larvae, somewhat stronger arsenical sprays should be used. The best time for scraping the larvae from the branches is during the moulting time, when they are quiescent. Where practicable, shallow ploughing in late autumn about the roots and around infested trees should reduce the number of moths for the following year. As nuts promise well as a commercial crop for southern Ontario, the economic importance of this pest will probably increase.

DOWNES (W.) & GLENDENNING (R.). **Two Insects affecting Cane Fruits in British Columbia.**—*Canada Dept. Agric.*, Circ. 22, 4 pp., 3 figs. Ottawa, March 1924. [Received 15th September 1924.]

In view of the increased acreage given up to raspberries, loganberries and blackberries in British Columbia, particularly in the Lower Fraser Valley, attention is drawn to the work of *Pennisetia* (*Bembecia*) *marginata* Harr. (crown borer) and *Phorbia rubivora*, Coq. (cane maggot), which are increasing. They are found on native species of *Rubus* common in the bush, and these should be removed from the vicinity of plantations. An account of the insects and measures against them is given [*R. A. E.*, A, viii, 208].

HUTCHINGS (C. B.). **The Lesser Oak Carpenter Worm and its Control.**—*Canada Dept. Agric.*, Circ. 23, 4 pp., 1 fig. Ottawa, May 1924. [Received 15th September 1924.]

Prionoxystus macmurtrei, Guér. (lesser oak carpenter worm) is one of the most destructive pests of red oak (*Quercus rubra*) in Canada. A description of the stages of the moth is given. The eggs are laid in crevices of the bark, and the young larvae tunnel about the bark, where they spend the first winter. During the next summer, work is continued in the sapwood, and later in the heartwood, where the larvae hibernate. During the third and final season, boring is wholly within the central areas of the tree, where very large holes are made deep in the wood. Towards the end of September of the third season the larva constructs a pupal chamber at the end of the tunnel and passes the winter as a pupa, the adults emerging throughout June of the following year. A successful remedy is to spray carbon bisulphide into the tunnels, plugging the entrance holes for a few days with damp clay. In extensive forest areas a spray similar to that previously described against

wood-boring species [*R. A.E.*, A, vii, 377] has been tried with good results, the principle of the spray being that when the larva comes to the tunnel entrance to clear out the débris it ingests enough of the poison to kill it. Lead arsenate (4 or 5 lb. to 1 U.S. gal. kerosene emulsion and 50 U.S. gals water) was used, as sodium arsenate injured the foliage severely. Young larvae can be removed from the outer bark with a sharp knife, the incision being stopped with grafting wax or painted to prevent infection. Trees in a sheltered position or with a southern exposure seem particularly liable to attack, and should be watched, and any very badly infested ones should be cut out and destroyed in the autumn or early spring.

GIBSON (A.). **The European Earwig : an Undesirable Pest.**—*Canada Dept. Agric.*, Circ. 24, 4 pp., 1 fig. Ottawa, May 1924. [Received 15th September 1924.]

Forficula auricularia, L. (European earwig) is rapidly increasing in British Columbia, where it has been known to damage the foliage of willows and maples planted along the streets of towns, and to attack many vegetable and garden plants and sometimes fruit on the trees, as well as being an important household pest. The bulk of the information given regarding its life-history and control has previously been noticed [*R. A.E.*, A, v, 444 ; xi, 429, 485].

PETCH (C. E.). **The Plum Curculio** (*Conotrachelus nenuphar*, **Herbst**) **and its Control in Quebec.**—*Canada Dept. Agric.*, Circ. 27, 3 pp., 1 fig. Ottawa, June 1924. [Received 15th September 1924.]

This is a popular account of this well-known pest under Quebec conditions, and describes spray mixtures suitable for different fruits. The important injury in Quebec is to apples. Pear, plum, cherry, etc., are also attacked.

PETCH (C. E.). **The Apple Maggot and its Control in Quebec.**—*Canada Dept. Agric.*, Circ. 28, 4 pp., 4 figs. Ottawa, July 1924.

An account is given of the life-history and habits of *Rhagoletis pomonella*, Walsh (apple maggot), as occurring in Quebec, with the latest suggestions for control. Dusting experiments are in progress, but more definite results are required before any recommendations can be made.

MAHEUX (G.) & CARON (O.). **Enemies of the Garden and Orchard.**—*Quebec Dept. Agric.*, Bull. 69, 29 pp., 4 pls. Quebec, 1921. [Received 18th September 1924.]

A brief description, accompanied by coloured figures, is given of the chief pests and diseases occurring in the Province of Quebec on garden plants, vegetables and fruit-trees, with suitable remedies for each. The preparation and use of various insecticides are discussed, and a calendar of work to be done in each month for plant protection is included.

MAHEUX (G.). **The Work done by the Quebec Bureau of Entomology.**— *Ann. Rept. Pomol. & Fruit Growing Soc. Prov. Quebec 1923*, pp. 46–50. Quebec [1924].

The work of the Bureau for 1922–23 is briefly reviewed, illustrating the activities of its different sections.

PETCH (C. E.). **Round-headed Apple-tree Borer** (*Saperda candida*, **Fab.) and its Control.**— *Ann. Rept. Pomol. & Fruit Growing Soc. Prov. Quebec 1923*, pp. 100–109. Quebec [1924].

This detailed account of the life-history and habits of *Saperda candida*, F. (round-headed apple-tree borer) [*cf. R. A. E.*, A, iii, 586] is based on a review of the work of previous authors, together with personal observations under Quebec conditions. The various remedial measures reported as satisfactory are also summarised.

MUTCHLER (A. J.) & WEISS (H. B.). **The Oil and Blister Beetles of New Jersey.**— *N. J. Dept. Agric., Bur. Stat. & Insp.*, Circ. 76, 19 pp., 6 figs. Trenton, N.J., July 1924.

Adult blister beetles are frequently injurious to vegetation in New Jersey, attacking garden and vegetable crops and sometimes the blossom of fruit-trees (plum, peach, pear, etc.). The larvae feed on grasshopper eggs and therefore are of some benefit. The larval period occupies from about 24 days to a month, during which time the larva feeds sporadically, between its moults, within the egg-mass of the grasshopper. Other species of these Meloids live at the expense of bees, to which the young larvae attach themselves and so get carried to the nests.

The species occurring in New Jersey, the food-plants and distribution of which are listed, include *Pomphopoea sayi*, Lec., *P. aenea*, Say, *Epicauta trichrus*, Pall., *E. strigosa*, Gyll., *E. batesi*, Horn, *E. vittata*, F., *E. cinerea*, Forst., *E. cinerea* var. *marginata*, F., *E. pennsylvanica*, DeG., *Macrobasis unicolor*, Kirby, *Zonitis bilineata*, Say, and *Nemognatha nemorensis*, Hentz. (blister beetles); and *Meloë angusticollis*, Say, and *M. americanus*, Leach (oil beetles). A key to the Meloids of New Jersey is given.

STURTEVANT (A. P.). **The Development of American Foulbrood in Relation to the Metabolism of its Causative Organism.**— *Jl. Agric. Res.*, xxviii, no. 2, pp. 129–168, 17 figs. Washington, D.C., 12th April 1924. [Received 20th September 1924.]

The characteristic appearance and age of the diseased and dead larvae differentiate American foulbrood caused by *Bacillus larvae* from European foulbrood caused by *B. pluton*. This investigation was undertaken to obtain further data concerning the growth requirements of *B. larvae*, by which to explain these differences in the symptoms and development of the two diseases. Through improved methods of cultivation a study has been made of factors concerned in the metabolism of the organism correlated with certain hitherto unrecognised biochemical factors associated with the normal metabolism of the honey bee larva. The results obtained add materially to the knowledge of the biology of the brood diseases.

Lead-eating Insects.—*Science*, lx, no. 1550, Suppmt. p. xii. Garrison, N.Y., 12th September 1924.

Efforts to stop the depredations of the lead-boring beetle [*Xylopertha declivis*, Lec.], which eats holes in lead-covered cables and causes as much as one-fifth of all wire troubles encountered by telephone companies in certain parts of the United States, have not so far met with much success. The beetle bites through everything, except steel, and eats its way through lead arsenate, creosote, carbolineum, copper, nicotine sulphate, sodium silicate, naphthalene compounds, spar varnish and other materials tried as protective measures.

Smith (C. E.). **Transmission of Cowpea Mosaic by the Bean Leaf-beetle.**—*Science*, lx, no. 1551, p. 268. Garrison, N.Y., 19th September 1924.

The bean leaf-beetle, *Ceratoma trifurcata*, Forst., is believed to be responsible for the spread of cowpea mosaic, which is now present in Louisiana, Arkansas and Indiana. The other principal insects associated with cowpeas showing the disease included *Diabrotica balteata*, Lec., *Nezara viridula*, L., and *Stictocephala festina*, Say.

Experiments demonstrated that the bean leaf-beetle is a definite and effective carrier of the mosaic. Beetles that had fed for one day on diseased plants, when transferred to healthy ones transmitted the disease in practically every case, the average time taken for the appearance of the disease being seven days.

Modification of Pink Bollworm Quarantine. Amendment No. 4 to Second Revision of Regulations Supplemental to Notice of Quarantine No. 52.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 3 pp. Washington, D.C., 26th August 1924.

These regulations regarding the interstate movement of cotton and cotton products, directed against the pink bollworm [*Platyedra gossypiella*, Saund.], and effective as from 2nd September 1924, are a revision of previous ones [*R. A. E.*, A, xii, 30, 330, 372], which they supersede.

Pettit (R. H.). **Onion Thrips** (*Thrips tabaci*). **Improved Methods of Control.**—*Qtrly. Bull. Michigan Agric. Expt. Sta.*, vi, no. 3, pp. 107–109, 2 figs. East Lansing, Mich., February 1924. [Received 24th September 1924.]

A brief and popular account is given of the life-history and habits of *Thrips tabaci*; the spray recommended for its control consists of about 1 U.S. pt. nicotine (40 per cent.) to 100 U.S. gals. water and 4 lb. laundry soap. Two applications should be made with an interval of 6 or 7 days. If a dust is applied, one of the standard nicotine dusts should be used.

Pettit (R. H.). **The Elm Leaf Beetle.**—*Qtrly. Bull. Michigan Agric. Expt. Sta.*, vii, no. 1, pp. 20–21, 1 fig. East Lansing, Mich., August 1924.

The elm leaf beetle [*Galerucella luteola*, Müll.] has become established in Michigan. A brief account of its life-history and habits is given.

The elm trees should be sprayed with 3 lb. lead arsenate to 100 U.S. gals. water when the beetles appear on the new growth in the spring and again when the larvae begin work in July. The point of application of the first spray is immaterial, as the beetles devour the entire leaf, but the second must be applied to the lower surface of the leaves, as the larvae feed almost exclusively on this surface.

Blake (M. A.). **Oriental Peach Moth dislikes some Peaches and Nectarines.**—*N. J. State Hort. Soc. News*, v, no. 1, pp. 73, 75. 1924. (Abstract in *Expt. Sta. Record*, li, no. 3, p. 255. Washington, D.C., 2nd September 1924.]

The oriental peach moth [*Cydia molesta*, Busck] shows a decided preference for certain varieties of peaches and nectarines. Of 125 different types and varieties tested, *Prunus mira* and *P. kansuensis*, introduced from China, were only slightly injured, and *P. davidiana* apparently remained untouched. Of various nectarines introduced from New Zealand, Sure Crop and Diamond Jubilee were not attacked.

Smulyan (M. T.). U.S. Bur. Ent. **Attacks of *Vespa communis* de Saussure on *Hyphantria cunea* Drury.**—*Psyche*, xxxi, no. 3–4, pp. 138–139. Boston, Mass., June–August 1924.

Vespa communis is reported attacking the caterpillars of *Hyphantria cunea* during September 1923 in New Jersey. This behaviour may probably be accounted for by the shortage of food.

Chung (H. L.). **The Sweet Potato in Hawaii.**—*Hawaii Agric. Expt. Sta.*, Bull. 50, 20 pp., 4 pls., Honolulu, October 1923. [Received 10th September 1924.]

Leaf-eating pests of the sweet potato in Hawaii cause little damage owing to the vigorous growth of the plant. They include *Adoretus tenuimaculatus* (Japanese beetle); a Tineid, *Bedellia orchilella* (sweet-potato leaf-miner); *Herse convulvuli* (sweet-potato sphinx), which generally oviposits on the leaves of morning-glory (*Ipomoea digitata*) and occasionally on sweet potato; and a leaf-roller, *Phlyctaenia despecta*. Lead arsenate sprays can be used successfully against all these pests. Cutworms (chiefly *Agrotis ypsilon*) injure and sometimes cut through the stems; and the weevils, *Euscepes* (*Cryptorrhynchus*) *batatae* and *Cylas formicarius* burrow in the roots, but damage can be greatly lessened by burning all infested potatoes and rubbish above ground and practising clean cultivation. A Pyralid stem borer, *Omphisa anastomosalis*, is perhaps the most injurious pest of sweet potatoes in Hawaii, as it damages both roots and stems, killing many of the plants. Clean cultivation should be practised, and the borers can be crushed in the stem by pressing the fingers up and down the tunnelled plants.

Neiva (A.), Costa Lima & Navarro de Andrade. **Relatario sobre a praga do café.**—[Report on the Pest of Coffee.]—*A Lavoura*, xxvii, no. 6, pp. 235–238. Rio de Janeiro, June 1924.

In view of the increasing losses due to the coffee berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Hag.), the government of S. Paulo has instituted a commission of enquiry, the report of which has already

been noticed from a summary [*R. A. E.*, A, xii, 484]. The infestation is confined to coffee, and the beetle breeds only in the berries. The latter should be stored in securely closed warehouses and disinfected by heat or fumigation, whichever may be proved more suitable by experiments that are being made. Another measure is the immediate preparation of the berries for the market. A draft is given of the regulations suggested for preventing the spread of the infestation by means of infested material.

BONDAR (G.). **Um insecto nocivo á vinha no Districto Federal.** [An Insect injurious to the Vine in the Federal District.]—*A Lavoura*, xxviii, no. 7, pp. 271–272, 1 fig. Rio de Janeiro, July 1924.

The information contained in this paper on weevils injurious to the grape vine has already been noticed [*R. A. E.*, A, xii, 224].

GOBBATO (C.). **Notas sobre agricultura.** [Agricultural Notes.]—*A Lavoura*, xxvii, no. 7, pp. 303–304. Rio de Janeiro, July 1924.

In order to protect their plants from ants, the natives in Brazil grow castor-oil plants in their gardens. It has now been found that if the seeds of this plant are placed on the glowing fuel in the combustion chamber of an ant fumigation apparatus, the fumes form a deposit in the nest that not only kills the ants, but prevents others from re-infesting it.

SALOMONE (G. A.). **El gusano de la manzano, pera y membrillo** (*Carpocapsa pomonella*). [The Apple, Pear and Quince Worm, *Cydia pomonella*.]—*Minist. Agric. de la Nación*, Circ. 296, 4 pp., 1 fig. Buenos Aires, 4th August 1924.

The losses due to *Cydia pomonella*, L., in the delta of the River Plate now amount to about 80 per cent. of the crop of apples, pears and quinces. This circular gives data on its morphology, biology and control.

Instrucciones prácticas para prevenir y distruir las distintas orugas que atacan al algodonero. [Practical Instructions for the Prevention and Destruction of the Caterpillars that attack the Cotton Plant.] —*Minist. Agric. de la Nación*, Circ. 303, 4 pp., 1 fig. Buenos Aires, 11th August 1924.

Simple instructions are given for the fumigation of cotton seed by means of carbon bisulphide. The text of the decree of 10th June 1924, noticed below, is reproduced.

Decreto relativo a la " Lagarta rosada " y otras plagas del algodonero, reglamentando el de fecha 10 de junio 1924. [A Decree concerning the Pink Boll Worm and other Pests of Cotton, regulating the Decree dated 10th June 1924.]—*Minist. Agric. de la Nación*, Circ. 306, 4 pp. Buenos Aires, 14th August 1924.

A presidential decree, dated 10th June 1924, scheduled *Platyedra gossypiella* (pink boll worm), *Heliothis obsoleta* and *Alabama argillacea* as pests of cotton in Argentina. The present one, dated 2nd July, supplements it by defining the measures to be taken against *P. gossypiella*.

DE SEABRA (A. F.). **Conferência internacional de Madrid sôbre os meios de luta contra o** *Dacus oleae* **ou Mosca da Azeitona.** [The International Conference in Madrid on Methods for Combating the Olive Fly, *D. oleae.*]—58 pp., 1 map. Coimbra [Portuguese Min. Agric.], 1924.

This is a report to the Portuguese Government on the Conference held at Madrid in June 1923, at which the author was the Portuguese delegate. The proceedings of the Conference have been noticed already [*R. A. E.*, A, xi, 548].

DE SEABRA (A. F.). **Instruções sôbre os processos aconselhados para combater o** *Dacus oleae* **ou Mosca da Azeitona.** [Instructions on the Methods advised for combating the Olive Fly, *D. oleae.*]—24 pp., 8 figs. Coimbra, [Portuguese] Min. Agric., 1924.

The various methods now recognised as effective against the olive fly, *Dacus oleae*, are described.

HEIKERTINGER (F.). *Otiorrhynchus crataegi* **Germ. und** *mastix* **Ol., zwei Zierstrauchschädlinge der Wiener Gärten.** [*O. crataegi* and *O. mastix*, two Pests of Ornamental Shrubs in the Gardens of Vienna.]—*Verh. zool.-bot. Ges. Wien*, lxxiii, pp. 119–128, 8 figs. Vienna, 1924.

Otiorrhynchus crataegi, Germ., unrecorded from Austria prior to 1920, is a pest of ornamental shrubs in Vienna, where it feeds on the foliage of *Syringa vulgaris*, *Ligustrum vulgare*, *Symphoricarpus racemosus*, etc. *O. mastix*, Ol., was taken only from *Syringa vulgaris* and *Ligustrum vulgare*. There is little doubt that these are the chief food-plants of both weevils. Captive females of *O. crataegi* oviposited in September; and the larvae, which hatched in October, are briefly described.

WILLAUME (F.). **La lucha contra el pulgón lanigero.** [Work against the Woolly Aphis.]—*Bol. Agric. Tec. y Econ.*, xvi, no. 188, pp. 739–742. Madrid, 31st August 1924.

This is a brief account of the woolly aphis [*Eriosoma lanigerum*] and the measures taken against it in France, no new information being given.

THOMPSON (W. R.). **Les larves primaires des tachinaires à oeufs microtypes.**—*Ann. Parasit. hum. & comp.*, ii, nos. 3 & 4, pp. 185–201 & 279–306, 4 pls., 5 figs. Paris, July & October 1924.

The general characters of Tachinids that lay their eggs on the food of the host are described, as well as their primary larvae.

SCHIRBER (E.). **Sur** *Abraxas pantaria*, **L. (Lep.).**—*Rev. Zool. agric. & appl.*, xxiii, no. 7, pp. 157–158. Bordeaux, July 1924.

The author has made a study of *Abraxas pantaria*, L., infesting ash, and has found its biology to be somewhat different from that described by other workers. The larvae were found on *Fraxinus excelsior* only, sometimes in enormous numbers. Pupation occurred

in autumn, and in Gironde at least (where these observations were carried out) the larva does not hibernate. Adults were caught as early as 27th April, and as late as 11th August, while the larvae were only in evidence in September and October ; this would seem to indicate one generation with a long period of emergence, though other workers have suspected two. The larvae are frequently parasitised by the Tachinid, *Discochaeta euonymellae*, Ratz.

FEYTAUD (J.). **Un parasite de la Miliade, *Lema flavipes*, Suffr.**—*Rev. Zool. agric. & appl.*, xxiii, no. 7, pp. 158–161. Bordeaux, July 1924.

The Criocerid, *Lema tristis*, Hrbst. (*flavipes*, Suffr.), infested *Panicum italicum* in the Landes district in 1922. Its life-history is apparently not well-known, but the allied species, *L. cyanella*, L., and *L. melanopa*, L., have often been recorded as pests of cereals in central Europe. Their life-history and habits are very similar, but sometimes differ from previous records in Russia [*R. A. E.*, A, i, 479] ; after pupating about the end of May, or beginning of June, the adults emerge during June and July, instead of hibernating in the cocoon, and may produce a second generation. In the Landes, *L. tristis* was numerous in July and August. *P. italicum* is the preferred food, millet in adjoining fields being very little damaged, and maize not at all. When the damage is very slight, the infested parts should be cut out, or the infested area should be cut down and the stubble burnt or dried and used as fodder. In April-May, when the insects assemble into groups for pairing, they can be easily collected. Cultivation is a useful auxiliary measure, as it exposes many of the insects in the soil. Early sowing is also an advantage, as the plants have time to grow strong enough to resist attack. Sprays have been recommended [*loc. cit*]. For France, in cases of severe infestation, Bordeaux mixture with nicotine, or a solution containing 1·5 per cent. soft soap and 0·15 per cent. pure nicotine, using about 50 to 60 gals. per acre, is advocated. Another method is to shake the larvae from the plants and then sprinkle them with slaked lime or ashes. At present, however, infestation seldom appears except in small, scattered areas.

MARCHAL (P.). **Travaux effectués dans les Stations d'entomologie agricole de l'Institut des Recherches agronomiques en 1923.**—*Rev. Zool. agric. & appl.*, xxiii, no. 7, pp. 162–170. Bordeaux, July 1924.

This report reviews the work in southern France on insect pests during 1923, which has been noticed from various sources, as well as investigations on insecticides and their use, the introduction of foreign parasites of pests, and special biological studies of certain groups.

PAILLOT (A.) & CHABROLIN (—). **Contre les Pucerons des arbres fruitiers.**—*Rev. Zool. agric. & appl.*, xxiii, no. 7, pp. 170–171. Bordeaux, July 1924.

This extract from a popular pamphlet reviews the chief remedial measures against Aphids attacking fruit-trees. The importance of keeping close watch for these pests and of beginning treatment with nicotine sprays at the earliest possible moment is urged, as well as of

thorough coating with the spray from all sides. Two or three applications are necessary, at 4 or 5 days' intervals. The formula recommended is 1 lb. nicotine extract (at 5 lb. per gal. strength) with 5 lb. soap in 50 gals. of water. This formula is not injurious to Syrphids and Coccinellids, which devour many of the Aphids. Equally good results are obtained with 5 per cent. pyrethrum powder mixed with a 2 per cent. solution of soap in ordinary or, if possible, rain water. In 3 days this mixture is ready for use, and must be diluted with an equal amount of water. This will keep for some time, and is cheaper than the nicotine solution, provided that the pyrethrum is home-grown.

Moyens de lutte contre les Fourmis.—*Rev. Zool. agric. & appl.*, xxiii, no. 7, pp. 171–173. Bordeaux, July 1924.

In answer to many enquiries, a résumé is given of the principal remedies against ants.

[**Fruit Pests.**]—*Ann. Rept. East Malling Res. Sta. 1923*, pp. 93–96. East Malling, Kent [1924].

The results of studies of resistance of various apple stocks to attacks of certain insects are briefly reviewed. Massee's work with *Aphis pomi*, DeG. (green apple aphis) indicates the possibility of perpetuating the degrees of resistance by propagating a race of stocks raised vegetatively from the resistant parent. The conveyance of such resistance from the stock to the scion has not been apparent.

Resistance to *Eriosoma lanigerum*, Hausm. (woolly aphis) has been studied by L. N. Staniland [*R. A. E.*, A, xi, 537].

The most practical method of controlling the apple blossom weevil [*Anthonomus pomorum*, L.] under Malling conditions is by trapping the weevils in sacking bands. Further investigations are to be made in order to determine the most suitable seasons and methods for applying and removing the bands, and to ascertain whether the weevils remain in the bands during the whole period of hibernation and what percentage of those caught will lay eggs the following season. The life-history and parasitic enemies are also being studied.

Grubb (N. H.) & Bagenal (N. B.). **Fungicidal Spraying of Apples.**—*Ann. Rept. East Malling Res. Sta. 1923*, pp. 120–124. East Malling, Kent [1924].

The addition of lead arsenate to fungicidal sprays apparently increased the percentage of apple blossom set when the spray was applied before blossoming, and even more so when applied after blossoming. This effect is in both cases due to the insecticidal action, though the insects concerned may not be the same. The applications after blossoming greatly reduced the number of fruits injured by sawflies, probably as a result of the larvae consuming sufficient arsenate to kill them before entering the fruit.

Tydeman (H. M.). **The Control of Big Bud Mite** (*Eriophyes ribis*, Nal.) **in the Field.**—*Ann. Rept. East Malling Res. Sta. 1923*, pp. 125–127. East Malling, Kent [1924].

In these experiments against *Eriophyes ribis*, Nal., on black currants, though no particular method gave completely satisfactory results, the severity of attack was reduced by the application of lime-sulphur at

winter strength (1 : 12) [*cf. R.A.E.*, A, xi, 538] towards the end of March, when the leaves were still quite small. Hand-picking, where not too expensive, is a useful auxiliary measure, but the cutting down of alternate bushes is not recommended. Even on " reverted " bushes the average number of " big buds " was somewhat reduced by the lime-sulphur and hand-picking treatments, though neither method has been capable of stemming the rapid increase of the mite upon these " reverts."

[Uvarov (B. P.).] **Уваров (Б. П.). Имперское Бюро Энтомологии в Лондоне, его Организация и Деятельность.** [The Imperial Bureau of Entomology in London, its Organisation and Activities.]— **Сельское и Лесное хозяйство** [*Agric. & Forest Econ.*], no. 13, reprint, 12 pp. Moscow, 1924.

The history and organisation of the Imperial Bureau of Entomology are briefly reviewed, the scope and object of its work being discussed with special reference to the main branches, namely, the identification of insects from all parts of the world and the publication of the *Bulletin of Entomological Research* and the *Review of Applied Entomology*.

Mordvilko (A. K.). **Faune de la Russie et des pays limitrophes.** — *Insecta Hemiptera*, i, pts. 1 & 2, pp. clxiv+1–236+1–9, 93 figs., and pp. 237–508, 55 figs. Petrograd, 1914, price 2 rbls.; and 1919, price 5 rbls.

These are the first two parts of a monograph (in Russian) on the Aphidoidea.

Acyrthosiphon, gen. n., is erected for *Aphis pisi*, Kalt. (of which *destructor*, Johns, is a subspecies), and the species referred to it are *Macrosiphum* (*Siphonophora*) *caraganae*, Cholodk., *M. loti*, Theo., *Siphonophora cyparissiae*, Koch, *Aphis urticae*, Schrank, *Macrosiphum* (*A.*) *ranunculinum*, Wlk., *Rhopalosiphum* (*Amphorophora*) *ampullatum*, Buckt., *Aphis rubi*, Kalt., *Siphonophora* (*Aphis*) *dirhoda*, Wlk. (*longipennis*, Buckt., *arundinis*, Theo.), and *Macrosiphum graminum*, Theo. *M.* (*Siphonophora*) *fragariellum*, Theo., is regarded as a subspecies of *A. rubi*.

The following new species and subspecies of *Acyrthosiphon* are described: *A. pisi turanicum* from Transcaspia on *Medicago sativa* and the Caucasus on *Trifolium*; *A. pisi ussuriensis* from Vladivostok on *Lathyrus* sp.; *A. orientale* from Amur district; *A. norvegicum* from Norway; *A. kamtshatkanum* from Kamtchatka; *A. genistae* from Russia, living on ends of stalks and branches of *Genista tinctoria* and probably having the same distribution as the food-plant; *A. ignotum* from Russia on *Spiraea* sp.; *A. ilka* from Siberia on *Papaver nudicaule*; *A. soldatovi* on *Spiraea* sp. from Eastern Siberia; *A. emelianovi* from Eastern Siberia; *A. gossypii* on cotton plants in Fergana and Transcaspia; *A. gossypii paczoskii* on *Lepidium perfoliatum* in Russia and probably wherever the food-plant occurs; *A. dubium* on a papilionaceous plant in Russia; *A. skriabini* on *Malva neglecta* in Turkestan; *A. moltshanovi* from Turkestan; *A. cyparissiae propinquum* from the Caucasus on *Euphorbia gerardiana*; *A. navozovi* from Orenburg on an umbelliferous plant, possibly an accidental occurrence; *A. urticae meridionale* from the Caucasus and the Crimea on *Urtica dioica*; *A. sibiricum* from Siberia on *Urtica* spp.; *A. sibiricum*

kirgiz from Uralsk on *Urtica dioica* ; *A. riabushinskii* from Kamtchatka; *A. rubi zhuravlevi* from Uralsk on *Rubus* sp. ; *A. rubi amurense* from Eastern Siberia on raspberry ; and *A. graminearum* from Russia on graminaceous plants. *Microlophium*, subgen. n., is erected for *A. urticae* and *Metopolophium*, subgen. n., for *A. graminearum*. *Amphorophora*, Buckt., is also treated as a subgenus of *Acyrthosiphon*.

Other species dealt with are : *Megoura* (*Aphis*) *viciae*, Kalt. ; *M. viciae abchasica*, subsp. n., from the Caucasus on *Lathyrus* spp. ; *M. viciae crassicauda*, subsp. n., from Eastern Siberia on *Lathyrus* spp. and *Faba vulgaris* ; *Paczoskia paczoskii*, gen. et sp.n., on stalks and branches of *Echinops ritro* in Russia ; *Anameson kamtshaticum*, gen. et sp.n., from Kamtchatka ; *A.* (*Macrosiphum*) *rubiellum*, Theo. ; *Macrosiphum* (*Aphis*) *rosae*, L. ; *M. rosae orientale*, subsp. n., on *Rosa* spp., from Vladivostok ; *M. rosae vasilievi*, subsp. n., from China on *Rosa* sp. ; *M.* (*Aphis*) *cholodkovskyi*, Mordv. ; *M. vereshtshagini*, sp.n., from Tomsk on *Cimicifuga foetida* ; *M. rushkovskii*, sp.n., from Ufa on *Bupleurum* sp., and from the Caucasus on *Valeriana alliariaefolia* ; *M.* (*Siphonophora*) *gei*, Koch ; *M. nasonovi*, sp.n., from Finland on *Vaccinium oxycoccus* ; *M. incertum*, sp.n., from Petrograd on *Stellaria* sp. ; *M. melampyri*, sp.n., from Esthonia on *Melampyrum nemorosum* ; *M.* (*Siphonophora*) *funestum*, Macchiati ; and *M. funestum shelkovnikovi*, subsp. n., from Transcaucasia on *Rubus* sp.

[Bugdanov (G. B.).] **Бугданов (Г. Б.). Из биологических наблюдений над перелетнои саранчей в период противосаранчевой кампании на территории Горской Республики в 1922 году.** [Biological Observations on *Locusta migratoria*, L., during the Anti-locust Campaign in the Territory of the Gorsky Republic in 1922.]—**Нар. Комисс. Землед. Горской Республики** [*Nat. Commissariat Agric. Gorsky Repub.*], 10 pp. Vladikavkaz, 1922.

The localities in which oviposition of *Locusta* (*Pachytylus*) *migratoria*, L., had occurred in the autumn of 1921 were not correctly determined, and this made the control of larvae in 1922 difficult. The hatching of the eggs extended over a period of 22 days, according to their depth in the soil and the exposure of the slopes on which they were laid. Larvae of different stages may be determined, apart from the usual characters (colour, size of wings), by the number of antennal joints, which increases with their development. Movements of larval swarms are markedly dependent on weather. Poisoned baits (40 lb. bran or sawdust, 2½–5 lb. sodium arsenate, 4 gals. water) have been tried, with excellent results.

[Krasnyanski (A. I.).] **Краснянский (А. И.). Биологический очерк перелетной или азиатской саранчи.** [Bionomics and Control of the Migratory Locust.]—**Издание Кубано-Черноморской Областной Противосаранчевой Организации** [*Publ. Kuban Black Sea Div. Anti-Locust Organ.*], 20 pp. Krasnodar, 1922. [Received 24th September 1924.]

This is a popular account of the life-history of *Locusta* (*Pachytylus*) *migratoria*, L., with the usual recommendations for control.

GRAM (E.) & ROSTRUP (S.). **Oversigt over Sygdomme hos Landbrugets og Havebrugets Kulturplanter i 1923.** [Report on Plant Diseases and Pests in Denmark in 1923.]—*Tidsskr. f. Planteavl*, xxx, pp. 361–414. Copenhagen, 1924. [With a Summary in English.]

Among the pests of cereals recorded in 1923 *Heterodera schachtii* var. *avenae* appeared unusually late, but damaged many oat fields, and locally also barley. *Agriotes lineatus* caused serious damage in wheat and rye fields, especially amongst the spring grains on soils of loose texture; beets and cabbages were also attacked. The larvae of *Hylemyia coarctata* destroyed some rye and many wheat fields, following fallow or late fallow. In Jutland *Tipula paludosa* damaged oats with ley, where sown following grass ploughed in October-November. Other cereal pests included *Limothrips cerealium*, *L. denticornis*, *Macrosiphum granarium*, *Siphonaphis padi* (*Aphis avenae*), *Trachea* (*Hadena*) *secalis*, *Oscinella* (*Oscinis*) *frit*, *Chlorops taeniopus* and *Contarinia tritici*.

Sitona lineata did some damage to peas in May. *Aphis rumicis* (*papaveris*) and *Pegomyia hyoscyami* were minor pests of beets and sugar-beets; *Blitophaga opaca* almost disappeared. The larvae of *Phorbia* (*Chortophila*) *brassicae* were active during the summer and autumn in fields of swedes, in cabbages and particularly in cauliflowers. Leaf-curl in swedes and cabbages, due to *Contarinia nasturtii*, was prevalent. Minor pests of crucifers included *Brevicoryne* (*Aphis*) *brassicae*, *Psylliodes chrysocephala*, *Ceuthorrhynchus sulcicollis*, *C. assimilis*, *C. quadridens*, *Meligethes aeneus*, *Plutella maculipennis* (*cruciferarum*), *Perrisia* (*Cecidomyia*) *brassicae*, *Pieris* spp. and *Phyllotreta* spp. *Trioza viridula* caused leaf-curl of carrots, mostly in Jutland; spraying with 0·1 per cent. nicotine sulphate solution was found efficient against it. Other pests included *Psila rosae*, which damaged carrots and curled parsley, *Siphocoryne capreae* on carrots and *Acidia heraclei* on celery. *Lygus pabulinus* was not an important pest of potatoes. *Tylenchus dipsaci* (*devastatrix*) did some damage to lucerne, and a very little to clover, the latter crop being locally damaged by *Apion apricans* and *Sitona lineata*.

Among the pests of apple were *Psylla mali*, *Plesiocoris rugicollis*, *Lepidosaphes ulmi* (*Mytilaspis pomorum*), *Aphis pomi*, *A. sorbi*, *Anthonomus pomorum*, which caused a severe attack in southern Jutland, and the larvae of *Blastodacna putripenella*, which did considerable damage in June and July around Copenhagen. *Cheimatobia boreata* and *C. brumata* caused considerable damage in several places to apple; gooseberries and black currants were also attacked. Minor fruit pests included *Hoplocampa testudinea*, *Argyresthia conjugella*, *Cydia* (*Carpocapsa*) *pomonella*, *Argyroploce* (*Olethreutes*) *variegana*, *Contarinia pyrivora*, *Paratetranychus pilosus*, *Eriophyes pyri*, and *Malacosoma* (*Gastropacha*) *neustria*.

Among the pests of stone fruits were *Argyresthia ephippiella*, which injured cherries, particularly the sour varieties, *Hyalopterus arundinis* (*pruni*), *Myzus cerasi*, *Otiorrhynchus picipes*, *Vespa* spp., *Eriocampoides limacina* and *Paratetranychus pilosus*.

Raspberries and blackberries were slightly attacked by *Byturus tomentosus* and *Pennisetia* (*Bembecia*) *hylaeiformis*. Gooseberry and currant pests included *Eriophyes ribis*, *Eriosoma* (*Schizoneura*) *ulmi*, *Eulecanium* (*Lecanium*) *corni*, *Pteronus* (*Nematus*) *ribesii*, *Pristiphora pallipes* (*N. appendiculatus*), *Abraxas grossulariata* and *Bryobia ribis*.

Heterodera radicicola and *Aphis sambuci* did some damage locally to elder. On hazel *Cheimatobia brumata* damaged the leaves, *Diplosis corylina* the catkins, *Eriophyes avellanae* the buds, and in one locality *Balaninus nucum* spoiled 50 per cent. of the nuts.

Strawberries were considerably damaged by *Anthonomus rubi*, *Oxygrapha* (*Acalla*) *comariana* and *Tarsonemus fragariae*. Cucumber plants in several localities were injured by spring tails, probably *Smynthurus viridis*, and local pests were *Tetranychus althaeae* and bugs (probably *Lygus pabulinus*). *Trialeurodes* (*Aleurodes*) *vaporariorum* attacked melons. Onion maggots (*Hylemyia antiqua*) were more or less injurious in several localities.

Chrysanthemums were damaged by *Aphelenchus ritzema-bosi*, cyclamens and begonias by *Euthrips parvus* in greenhouses, and the larvae of *Naenia typica* infested chrysanthemum and cyclamen. Pelargoniums were severely infested by *Trialeurodes vaporariorum*. *Phytomyza affinis* mined the leaves of chrysanthemum and cineraria, and the former was also infested by *Spilographa zoe*.

Abies was attacked by *Chermes piceae*, *Prunus padus* by *Siphonaphis* (*Aphis*) *padi*, oak by *Phylloxera coccinea*, elm by *Eriosoma* (*Schizoneura*) *ulmi*, and willows by *Cossus cossus* (*ligniperda*).

Ardis bipunctata did much damage to roses in Jutland, and minor pests were *Blennocampa pusilla* and *B. aethiops*. *Hylemyia brunnescens*, formerly erroneously recorded as *H. cardui* [*R. A. E.*, A, xi, 522], attacked carnations in one locality.

Melolontha melolontha (*vulgaris*) damaged strawberries, barley, oats, cauliflowers (but not brussel-sprouts), *Rosa canina*, etc.; *Euxoa* (*Agrotis*) *segetum* and other cutworms damaged cauliflowers, potatoes and leeks.

Boas (I. E. V.). **Dansk Forstzoologi.** [Danish Forest Zoology.]—2nd enl. edn., xxii+761 pp., 638 figs., 22 pls. Copenhagen, Gyldendal, 1923. Price *Kr.* 40.

As a result of the experience gained since the first publication of this work about 27 years ago, this edition has been greatly enlarged and gives a considerable amount of information concerning the different forms of mammals, birds and especially insects occurring in Danish forests.

Kløver og Lucerneaalens Levevis og Bekaempelse. [Life-histories of *Tylenchus dipsaci* in Clover and Lucerne, and Measures against it.]—*Statens Forsøgsvirksomhed i Plantekultur*, Meddel. 109, 4 pp., 2 figs. Copenhagen, June 1924.

It is stated that clover is seldom infested with *Tylenchus dipsaci* (*devastatrix*) from lucerne, but that lucerne is more easily infested from clover, though the most common infestation is from clover to clover and lucerne to lucerne. *T. dipsaci* is also spread in soil, through the intermediary of running water, man, animals, carriages and tools, and in crops (green clover and hay) that may be left on the field in harvesting. Hay that has been kept during a winter is still capable of spreading infection, and infested stable refuse that has lain for some time in the upper part of a manure heap when spread on the fields can

distribute this Nematode. Where the soil is seriously infested, clover should not be cultivated during a rotation of 8 years, but *Lotus* (for two-years' grassland) and *Anthyllis* or *Medicago* (for one year's grassland) should be grown instead.

ESCHERICH (K.). **Die Forstentomologie in Schweden.** [Forest Entomology in Sweden.]—*Forstwiss. Centralblatt*, 1924, no, 11, pp. 437–447.

This paper gives a brief account of Dr. Trägårdh's work as illustrative of the development of forest entomology in Sweden in recent years.

VINCENS (F.). **Possibilité de la transmission de la loque pernicieuse du couvain des Abeilles par les chenilles de la fausse teigne** (*Galleria mellonella* **L.**).—*C. R. hebdom. Acad. Sci.*, clxxix, no. 12, pp. 574–577. Paris, 1924.

It is found that the larvae of *Galleria mellonella*, L., feed without any ill effects on the dried up bodies of larvae of bees killed by *Bacillus larvae*, and enormous numbers of living spores of the bacillus are present in the excreta of larvae of *G. mellonella* that have devoured infected material. The larvae of *G. mellonella* travel from hive to hive, and may thus disseminate living germs of American foulbrood.

RITZEMA BOS (J.). **Bestrijding van de bietenvlieg** (*Anthomyia conformis* **Fall.**=*Pegomyia hyoscyami* **Panz.**). [The Control of the Beet Fly, *P. hyoscyami*.]—*Tijdschr. Plantenziekten*, xxx, no. 2, pp. 46–48. Wageningen, February 1924. [Received 23rd September 1924.]

The information given here is taken from Dr. F. Rambousek's articles in *Berichte der Versuchsstation für Zuckerindustrie*; *Rübenschädlinge und Krankheiten* 1922 and in *Zeitschrift für die Zuckerindustrie der Tsechoslav. Republik*, iv, 1922–1923.

The beet-fly, *Pegomyia hyoscyami*, Panz., increased extraordinarily in Czecho-Slovakia, especially in Bohemia, in 1922, not a field being free from infestation. Owing to the long and severe winter both beet and weeds developed slowly, and the beet plants were thinned out later than usual, the weeds being removed at the same time. Consequently when the flies emerged from the ground there was no *Atriplex* available and they could only oviposit on beet, whereas the eggs of the first generation are usually laid on *Atriplex*. Furthermore, much injury resulted from uprooted beet plants being left lying in the fields so that larvae from them migrated to growing beet. Smoke was used to prevent oviposition by the second generation, and this gave good results, especially where pitch was added to the fuel used, or where dried tomato or other Solanaceous plants were burnt. The other measures advocated are ploughing under to a depth of 7–8 inches; this enables humidity to kill the pupae and hinders the emergence of the adults; manuring with artificial instead of stable manure; and the removal of the beet plants uprooted when thinning out. *Opius nitidulator*, Nees, is the commonest parasite. *Apanteles congestus*, Nees, and a Tachinid, *Melanophora atra*, Macq., also occur.

Paerels (J. J.). **Overzicht over de voornaamste ziekten en plagen van den cacaoboom op Java.** [A Survey of the principal Diseases and Pests of the Cacao Tree in Java.]—*Tijdschr. Plantenziekten*, xxx, no. 3, pp. 51–61. Wageningen, March 1924. [Received 23rd September 1924.]

Cacao in Java is attacked by the following insects :—

Pests of the fruit. *Helopeltis antonii*, Sign., and *H. theivora*, Waterh., retard the growth of the older pods and cause the young ones to shrivel and drop off. If the infestation is slight, collection is advised, but otherwise burning off should be practised or, alternatively, the ant, *Dolichoderus bituberculatus*, Mayr, should be established on the trees. This ant, however, encourages the mealybugs, *Pseudococcus crotonis*, Green, and *P. citri*, Risso, which can be injurious to cacao. Boring caterpillars are the Tineid cacao moth, *Acrocercops cramerella*, Sn. (the greatest pest of cacao in Java) and *Aegeria* (*Sesia*) *hector*, Butl., and *Aegeria* sp. The last-named preferably bores into pods attacked by *Helopeltis*.

Pests of the stem and branches. The young shoots are attacked by *Helopeltis*, natural enemies of which include Mantids, Reduviid bugs, spiders, and birds. *Zeuzera coffeae*, Nietn., mines the branches, which must be removed and burned. Its natural enemies are a Braconid, a fungus and a Dipterous larva. The Hepialid ring borer, *Phassus damor*, Moore, attacks the bark of the stem and the roots. To combat it, tarred tow is pushed into the holes. *Arbela dea*, Swinhoe, and *A. tetraonis*, Moore, do the same sort of damage as *Z. coffeae* and are dealt with in the same way. The Cerambycids, *Glenea novemguttata*, Cast., *Monochamus* (*Monohammus*) *fistulator*, Germ., *M. lateralis*, Guér., *Epepeotes luscus*, F., *Pelargoderus bipunctatus*, Dalm., and others are pests of cacao, the first named being the most dangerous. The larvae bore into the woody part of the plant for pupation. At an early stage of boring they may be removed by cutting away the bark, but later the branch or the stem must be cut off. The Scolytid, *Xyleborus coffeae*, Würth, attacks young plants as well as older trees, but usually appears when trees have been injured through other causes. On the first appearance of the infestation the removal and burning of the branches may prove successful. The adult and larval stages of the Curculionid, *Alcides leeuweni*, Heller, do serious injury, causing the branches to die. The adults should be collected. The larvae of two Buprestids, *Chrysochroa fulminans*, F., and *Catoxantha bicolor*, F., bore into the wood and sometimes do considerable damage. They may be extracted from the holes or killed by injecting carbon bisulphide. Termites, ants, especially *Plagiolepis longipes*, Jerd., crickets and locusts are other pests of the stem and branches.

Pests of the foliage. Some mealy-bugs, especially *Pseudococcus crotonis*, infest the leaves ; natural enemies include a butterfly, *Spalgis epius*, Westw. Leaf-rolling Tortricid caterpillars do less harm than those of Limacodids, such as *Orthocraspeda trima*, Moore, and *Parasa lepida*, Cr., which can defoliate entire plantations. Other injurious Limacodids are *Altha castaneipars*, Moore, *Setora nitens*, Wlk., *Scopelodes unicolor*, Wlk., *Miresa albipuncta*, H.-S., and *M. argentifera*, Moore. Psychid caterpillars include *Heylaertsia larminati*, Joan., *Animula sumatrensis*, Heyl., *Eumeta crameri*, Westw., *E. layardi*, Moore, and *Pteroma reynvaanii*, Heyl. They cut pieces out of the leaves, collection being the remedy advised against them. The adults

of Chrysomelid beetles, *Antipa* spp., *Euphitrea micans*, Baly, and *Pseudaplosonyx coeruleipennis*, Duviv., may sometimes prove very injurious. Curculionids doing damage by piercing the leaf-veins include *Peltotrachelus* (*Myllocerus*) *isabellinus*, Boh., *M. subvirens*, Boh., and *Phytoscaphus triangularis*, Ol. (*lixabundus*, Boh.). Lamellicorn beetles, which eat holes in the leaves, include *Adoretus umbrosus*, F., and others of the genera *Apogonia*, *Anomala*, *Brahmina*, *Serica* and *Holotrichia*.

Ritzema Bos (J.). **Leefwijze van de sluipwesp** *Microgaster* (*Apanteles*) *glomeratus*. [The Life-history of the Braconid, *A. glomeratus*.]—*Tijdschr. Plantenziekten*, xxx, no. 4, pp. 65–67. Wageningen, April 1924. [Received 23rd September 1924.]

The general belief that *Apanteles* (*Microgaster*) *glomeratus* oviposits only in the older larvae of the cabbage white butterfly[*Pieris brassicae*] seems to be incorrect, but further observation is needed to ascertain if it is the eggs or the newly hatched larvae that are thus parasitised.

Ritzema Bos (J.). **Millioenpooten** (*Blaniulus guttatus* **Gerv.), schadelijk aan suikerbieten.** [Millipedes, *B. guttatus*, injurious to Sugar-beet.]—*Tijdschr. Plantenziekten*, xxx, no. 4, p. 80. Wageningen, April 1924. [Received 23rd September 1924.]

In the *Zeitschrift für die Zuckerindustrie der Tsechoslavischen Republik*, xlvii (iv), no. 24, Dr. F. Rambousek reports that in 1921 the millipede, *Blaniulus guttatus*, Gerv., directly destroyed many seeds and germinating beet plants in Czecho-Slovakia, and was even more harmful by introducing many diseases. The beet seed may be treated with solutions of either formaline, Bordeaux mixture or mercury bichloride, or in the fields destined to be planted with beet, shelter traps of wet boards or poison-baits may be used. The latter are very effective if the bait is pieces of potato previously soaked for half an hour in a 5 per cent. solution of barium chloride or in a ½ per cent. solution of arsenic.

van Keulen (K.). **Beschadiging van augurken door springstaarten.** [Injury to Gherkins by Springtails.]—*Tijdschr. Plantenziekten*, xxx, no. 7, pp. 124–125. Wageningen, July 1924. [Received 23rd September 1924.]

At Onderdijk, Holland, the seed-lobes of gherkins were attacked by a Collembolan, probably *Smynthurus* sp. The infestation was checked by spraying with Paris green.

Ritzema Bos. (J.). **Het een en ander over de groote dennensnuittor** (*Hylobius abietis* **L.).** [Notes on the large Pine Weevil, *H. abietis*.] —*Tijdschr. Plantenziekten*, xxx, no. 7, pp. 126–127. Wageningen, July 1924. [Received 23rd September 1924.]

In the *Zeitschrift für Forst- und Jagdwesen*, lv, 1923, Dr. A. Krausse has recorded his observations on a number of *Hylobius abietis*, L. (large pine weevil) in captivity. *H. abietis* gnaws the pine twigs as well as the bark. The May shoots of Weymouth pine [*Pinus strobus*] are readily accepted, and the old needles are cut and partly eaten.

The weevils prefer the young May shoot to the bast of older twigs. They feed on the bast and leaves of twigs (and on the twigs themselves) of hornbeam [*Carpinus*], horse chestnut [*Aesculus*], maple and Virginia creeper, and on the bast only of *Colutea*. Both the bast and leaves of lilac twigs were eaten.

DE VIN (T. J.). **Wanneer Parisch groen en wanneer chloorbarium te gebruiken ter bestrijding van de bessenbastaardrups.** [When Paris Green and when Barium Chloride should be used against the Larvae of *Pteronus ribesii*.]—*Tijdschr. Plantenziekten*, xxx, no. 8, pp. 129–131. Wageningen, August 1924.

Owing to the bad quality of the Paris green (containing only half the standard (55–58 per cent.) amount of arsenious oxide) used against it, the first generation of *Pteronus ribesii* was followed by a second, causing a serious infestation of bush fruits. As an arsenical was inadvisable, spraying was done with a 2 per cent. solution of barium chloride. The addition of 1 per cent. lime was found convenient to indicate the area treated.

SMITS VAN BURGST (C. A. L.). **Twee parasieten van de Wasmot (*Galleria mellonella* L.).** [Two Parasites of the Wax Moth.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 139, pp. 295–298. The Hague, 1st September 1924.

The parasites of the wax moth, *Galleria mellonella*, L., here discussed are the Chalcid, *Dibrachys boucheanus*, Ratz., and the Ichneumonid, *Angitia chrysosticta*, Gmel. The latter does not appear to have been recorded hitherto from this moth.

SARRA (R.). **Notizie biologiche di un coleottero (*Lixus anguinus* L.) dannoso ai cavoli.** [Biological Notes on *L. anguinus*, a Coleopterous Pest of Cabbages.]—*Boll. Lab. Zool. gen. agrar. Portici*, xvii, pp. 137–146. Portici, 1924.

A brief description is given of all stages of the weevil, *Lixus anguinus*, L., found in Central and Southern Europe, the Caucasus and North Africa. Its food-plants are *Artemisia campestris*, tree cabbage, and *Brassica oleracea* var. *capitata*. The weevils hibernate in the ground; they emerge about the end of February and feed on the leaves of cabbage. They have not been seen to fly. Five females laid 160 eggs during a period of 73 days from 10th April to 21st June. In the fields eggs have been found up to mid-September. The egg is laid in a cavity scraped in the leaf-surface, and it is covered with the débris. Hibernated adults did not live beyond September. In April and May incubation requires 9–10 days. The larva feeds inside the mid-rib, reaches the peduncle and matures in the stem of the plant. Pupae were first observed in the middle of July. No larvae were seen after the first ten days of August. The pupal stage lasts about 10 days.

If present in large numbers *L. anguinus* would be a serious pest, but, both in the egg and larval stages, it has many natural enemies, including a Chalcid, *Habrocytus lixi*, sp. n., which is described, and a Braconid, *Bracon fortipes*, Wesm. Most of the eggs parasitised by *H. lixi* are found in May. The mature larvae leave the host-egg and rest for 4–5 days before pupating. Pupation requires 8–9 days, and the adults appear from mid-May to early July. Most of the Chalcids die about

the end of August. There is one generation a year, 65 per cent. of the eggs of *L. anguinus* being thus parasitised. *B. fortipes* is an endophagous parasite of the larva of *L. anguinus*, but is of slight importance.

The weevils should be collected in February and March. Later on the cabbage stalks should be removed and placed in boxes with a cover of gauze to permit the escape of parasites.

Foà (A.). **Modificazioni al ciclo morfologico e biologico del** *Nosema bombycis* **Nägeli.** [Modifications in the morphological and biological Cycles of *N. bombycis*.]—*Boll. Lab. Zool. gen. agrar. Portici*, xvii, pp. 147–163, 3 figs. Portici, 1924.

The contents of this paper on *Nosema bombycis* infesting silkworms are indicated by its title.

Feytaud (J.). **A propos du Termite des Charentes.**—*Procès-verb. Soc. Linn. Bordeaux*, lxxvi, no. 1, pp. 69–72. Bordeaux, 15th September 1924.

The author has found *Reticulitermes flavipes*, Kollar, in various parts of the district between Bordeaux and Sables d'Olonne, thus showing to be erroneous the opinion held, with few dissentients, since 1797, when termites were first found doing serious damage at Rochefort, that the termites of this area are exclusively *Leucotermes* (*Termes*) *lucifugus*, Rossi.

Wolff (M.). **Ueber einige praktisch wichtige Borkenkäferprobleme.** [On some Bark-beetle Problems of practical Importance.]—*Ent. Blätter*, xx, no. 3, pp. 166–170. Berlin, 30th September 1924.

Contrary to the view generally accepted, the smaller pine beetle, *Myelophilus* (*Blastophagus*) *minor*, Htg., is a far more serious pest than the large pine beetle, *M.* (*B.*) *piniperda*, L. *M. minor* is essentially a primary pest and attacks quite healthy pine trees. It may continue to infest the crowns of the trees until the plantation is in a condition to be attacked by *M. piniperda*. In most cases where pines die as a result of attack by these Scolytids the actual harm is due to *M. minor*, but is ascribed to *M. piniperda*, of which the mines are visible when the trunks are barked. Felled trap-trunks, especially if examined for the fresh signs of the current year's infestation, give quite a wrong impression, revealing the presence of *M. piniperda* only. *M. minor* seems to fly at some height. After repeated observations it was not seen close to the ground, where *M. piniperda* abounded, but branches torn off by autumn storms harboured it in numbers. In a forest kept in such good condition that *M. piniperda* is entirely absent, injury by *M. minor* is very noticeable.

Trappmann (W.). **Die Anwendung flüssiger Arsenköder im Pflanzenschutz.** [The Use of Liquid Arsenical Baits in Plant Protection.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 10, pp. 75–76. Berlin, 1st October 1924.

In connection with the introduction and rapidly increasing use of arsenical insecticides in Germany, attention is drawn to the arsenical bait-sprays largely used in southern Europe against the adults of the olive fly [*Dacus oleae*] and other pests.

GASOW (—). **Gallmückenlarven in Luzerneblüten.** [Gall-midge Larvae in Lucerne Blossoms.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 10, pp. 76–77, 1 fig. Berlin, 1st October 1924.

Besides the gall-midges already noted as infesting lucerne [*R. A. E.*, A, xii, 437, 438] another species, *Contarinia medicaginis*, Kieff., was abundant in Germany during the summer of 1924. This Cecidomyiid is a well-known pest of the flowers of lucerne. As the signs of attack are observed in practice too late for remedial measures to be undertaken, the crop should be cut and used as green fodder.

Amtliche Pflanzenschutzbestimmungen. [Official Regulations on Plant Protection.]—*Nachrichtenblatt deutschen Pflanzenschutzdienst.*—Beilage [Suppmt.], no. 1, 16 pp. Berlin, 1st October 1924.

This publication, which is to be issued about three times a year, lists the current German regulations respecting insect and other pests of plants.

Departmental Activities.—*Jl. Dept. Agric. Union S. Africa*, ix, no. 3, pp. 191–195. Pretoria, September 1924.

Root infestation of peach trees by the black peach aphis [*Anuraphis persicae-niger*, Smith] is recorded from various districts, though this form of infestation has previously never been found in South Africa. In all cases the infested trees were in more or less loose sandy soil.

Many reports have been received of the poisonous effect of delphiniums on locusts; in one instance, where the entire crop of other flowers was destroyed, fields of delphiniums remained almost uninjured, as wherever the locusts nibbled the flowers they died by the million.

Observations on a disease of maize transmitted by *Balclutha* sp. have already been noticed [*R. A. E.*, A, xii, 468]. Attempts to secure transmission of the true mosaic disease of maize by the agency of this Jassid have failed.

[SOUTH AFRICA. Agricultural Pests Act 1911.] **Proclamation no. 172.**—*Govt. Gaz.*, no. 1410. [Pretoria] 8th August 1924.

The movement from one place in the Union of South Africa to another of the following plants is prohibited: fruit- or nut-bearing plants infested with *Heterodera radicicola*; oak trees infested with *Asterolecanium variolosum*; araucaria trees infested with *Eriococcus araucariae* or *Pseudococcus aurilanatus*; apple or pear trees infested with *Eriosoma* (*Schizoneura*) *lanigerum*; any fruit- or nut-bearing plant, or any plantation or ornamental plant infested with *Aspidiotus perniciosus*, *A. pectinatus*, *Chrysomphalus dictyospermi*, *C. aurantii*, *C. rossi*, *C. aonidum* (*ficus*), *C. pinnulifera*, *Selenaspidus silvaticus*, *Morganella maskelli*, *Parlatoria pergandei*, *P. zizyphus*, *Diaspis* (*Aulacaspis*) *pentagona*, *Lepidosaphes pinnaeformis*, *L. gloveri*, *Ischnaspis longirostris*, *Howardia moorsi* and *Coccus* (*Lecanium*) *africanus*.

Dry (F. W.). **Sex Ratio Data for two Chalcid Egg Parasites of the Coffee Bug** (*Antestia lineaticollis*).—*Jl. Genetics*, xiv, no. 2, pp. 219–224. Cambridge, August 1924.

Hadronotus antestiae, Dodd, and *Telenomus truncativentris*, Dodd, the two common Proctotrupid egg parasites of the coffee bug (*Antestia lineaticollis*, Stål) can both reproduce parthenogenetically, all the offspring so produced being males; but it is concluded that under natural conditions mating is the rule, and that in the offspring of fertilised insects the females regularly outnumber the males by three or four to one. These parasites thus present an interesting problem in sex determination. They are easy insects to work with, for both the parasites as well as their host breed all the year round in the highlands of Kenya Colony, and *A. lineaticollis* readily lays eggs in confinement.

Quarantine Proclamation no. 126.—*Commonwealth of Australia Gaz.*, no. 41. Melbourne, 26th June 1924.

As a precaution against the European corn-borer, *Pyrausta nubilalis*, the importation of broom corn millet into Australia is prohibited, unless it is subjected to steam disinfection on arrival.

Quarantine Proclamation no. 128.—*Commonwealth of Australia Gaz.*, no. 52. Melbourne, 24th July 1924.

The importation into Australia of tobacco plants and seeds is prohibited, except on application by a State Department of Agriculture, subject to such conditions as the Minister may impose.

Welch (M. B.). **Note on the Effect of Temperature on Borers attacking seasoned and unseasoned Timber (with special Reference to the Furniture Beetle,** *Anobium striatum*).—*Jl. Proc. R. Soc. N.S.W. 1923*, lvii, pp. 227–230. Sydney, May 1924.

The application of heat to both seasoned and unseasoned timber infested with borers in New South Wales has proved a most efficient remedy. Exposure of both larvae and adults of the furniture beetle, *Anobium striatum*, the powder post beetle, *Lyctus brunneus*, and of shot-hole borers (Scolytids) to about 45°C. [113°F.] for one minute in moist air has, in the majority of cases, proved fatal to them. The treatment can be successfully applied to logs, sawn timber and smaller made-up articles.

Knibbs (Sir G. H.). **Agricultural and Pastoral Industries.**—*1st Ann. Rept. Inst. Sci. & Indust., 1921–22*, pp. 10–22. Melbourne, 31st July 1922. [Received 22nd September 1924.]

A brief account is given of the various investigations undertaken by the Institute, which include the prickly pear problem and the collection of information on termites.

McCarthy (T.). **The Brown Vegetable Weevil,** *Listroderes* (*Desiantha*) *nociva*.—*Agric. Gaz. N.S.W.*, xxxv, pt. 8, pp. 573–580, 7 figs. Sydney, 1st August 1924.

Much of the information in this paper regarding *Listroderes nociva* has been previously noticed [*R. A.E.*, A, iv, 109 ; xi, 109, 110, 374, 505]. Its distribution in New South Wales is recorded. Potatoes and tomatos are the favourite cultivated food-plants ; besides other plants, the Cape weed (*Cryptostemma calendulaceum*), introduced many years ago from S. Africa, becomes heavily infested with larvae in mid-winter and with adults in October. Where the beetles are abundant the foliage quickly disappears from the plants, and even the stalks may be devoured ; the larvae are somewhat less destructive. The various stages are described. The adults appear to be considerably attracted to artificial light at night. The earliest adults have been reported during August and September in New South Wales, October and November being the period when the greatest damage is done ; they have also been taken in late March, so that there seems to be no marked differentiation of generations, although further evidence as to this is required. Experiments show that 1 lb. lead arsenate powder in 50 gals. water kills 78 per cent. of the weevils in 2 days, while dusts of lead arsenate and calcium arsenate kill 83 and 87 per cent. respectively. Calcium arsenate should prove the more effective dust ; potatoes are not injured by the undiluted powder ; but for more delicate plants it might be diluted to 1 part to 10 of hydrated lime. For small plants, the tops of Cape weed, potato or other available food-plants may be dipped in a lead or calcium arsenate solution, or dusted with diluted powder after dipping in water, and placed between the rows of infested plants. This should be done towards evening, so that the treated tops are fresh and attractive when the beetles are feeding. Clean cultivation is a great asset ; thick growths of Cape weed and similar plants should be destroyed in early winter.

Walker (W. M.). **Spray Gun** *versus* **Nozzle. Their Comparative Efficacy against Woolly Aphis.**—*Agric. Gaz. N.S.W.*, xxxv, pt. 8, pp. 589–590. Sydney, 1st August 1924.

Further experiments have been made to test the relative merits of spray gun and nozzle [*R. A.E.*, A, xi, 378]. A greater quantity of spray was required to clear *Eriosoma lanigerum* from apple trees continually sprayed with nozzles than from those on which a gun had been used, but it is rather doubtful whether the gun is satisfactory for the application of lead arsenate sprays for codling moth [*Cydia pomonella*, L.], especially at the calyx stage. Further experiments will be necessary before a definite opinion can be given. The gun has been found easier and more convenient to manipulate than any length of rod.

Cottrell-Dormer (W.). **Cane Pests and Diseases.**—*Queensland Agric. Jl.*, xxii, pt. 2, pp. 85–86. Brisbane, August 1924.

Slight damage in the Babinda district is reported from grubs of the grey back beetle [*Lepidoderma albohirtum*, Waterh.] and of *Lepidiota frenchi*, Blackb. *Rhabdocnemis obscura*, Boisd., is being effectively controlled by the Tachinid parasite [*Ceromasia sphenophori*, Vill.],

which has become established in every district where Badila is the standard cane. Other sugar-cane pests recorded are *Aphis sacchari*, Zehnt., *Cirphis unipuncta*, Haw., and a wireworm, *Monocrepidius* sp.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxii, pt. 2, pp. 95–96. Brisbane, August 1924.

Towards the end of May a fungus, *Empusa* sp., appeared in a large breeding-cage of *Ceromasia sphenophori*, Vill.; under favourable atmospheric conditions it can destroy the Tachinids in a few hours.

A study of cane grubs of the Herbert River district shows *Lepidoderma albohirtum*, Waterh., to be the most injurious, the others in order of their importance being *Anoplognathus boisduvali*, Boisd., and *Dasygnathus australis dejeani*, Macl. The last named is of minor importance in the Cairns district, where *A. boisduvali* comes third in importance and *Lepidiota frenchi*, Blackb., second. Experiments with calcium cyanide for the control of cane grubs are being continued, with very promising results. If found effective in field practice, it would be cheaper than paradichlorobenzene or carbon bisulphide. It does not in any way injure the plants. The value of paradichlorobenzene has been conclusively proved.

JARVIS (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl.*, xxii, pt. 2, pp. 110–112. Brisbane, August 1924.

The insectary and field cage records of pupation and emergence of adults of *Dacus ferrugineus*, F. (*Chaetodacus tryoni*, Frogg.) (Queensland fruit-fly) for May and June are tabulated. The 12th May is so far the date of the latest occurrence of adult fruit-flies in the field in the Stanhope area. Attempts to induce oviposition in captivity were unsuccessful. Apparently the adults cannot withstand the rigorous cold of the winter months at Stanhope, though it is possible that they may do so under favourable conditions, such as the shelter of hollow trees or under thick bark.

The larvae of a fruit-fly were found in the berries of a native tree, *Notoloea longifolia*, as late as 16th June.

A Fulgorid is recorded as occurring on quince and apple trees, though not apparently causing much damage; the infestation probably originated from the long grass surrounding the trees.

JARVIS (E.). **The Economic Value of Certain Queensland Parasitic Insects.**—*Queensland Agric. Jl.*, xxii, pt. 2, pp. 113–116, 1 pl. Brisbane, August 1924.

Brief notes are given on some little known useful insect enemies of sugar-cane pests. *Apanteles nonagriae*, Oliff, which was bred from *Phragmatiphila truncata*, Wlk., has a total life-cycle of 14 days. It probably parasitises other Noctuid larvae and produces successive broods throughout the summer, as *P. truncata* is not found after December. An earwig, *Labia* sp., feeds on all stages of *Aphis sacchari*, Zehnt. It survives 2 months or more in tubes, requiring very little attention, so that introduction into other countries should be easily effected. Larvae of the predacious beetle, *Chlaenius australis*, Dej., were found in 1920 destroying the larvae of *Laphygma exempta*, Wlk.; in captivity they were fed on Noctuid larvae and pupae and pupated

at the bottom of breeding-cages filled with deep soil, the pupal stage lasting 7 days in March. This beetle should be easily transported in the adult stage. Other species mentioned are the Scoliid wasps, *Campsomeris tasmaniensis*, Sauss., and *C. radula*, F., with a list of their hosts. The life-cycle occupies about 47 days, including 3, 8 and about 36 days for the egg, larval and intra-cocoon stages respectively.

Kunkel (L. O.). **Studies on the Mosaic of Sugar Cane.**—*Bull. Expt. Sta. Hawaiian Sugar Planters' Assoc.*, Bot. ser., iii, no. 2, pp. 115–167, 7 pls., 19 figs. Honolulu, April 1924.

Most, if not all, of the spread of mosaic disease of sugar-cane in Hawaii is due to the corn aphis, *Aphis maidis*, Fitch. Clean seedlings of Sudan grass [*Sorghum sudanense*], a favourite food-plant of this Aphid, became infested when exposed for one day on a grass lawn about fifty yards from Aphid-infested maize and Sudan grass. While *A. maidis* does not flourish on the varieties of sugar-cane grown commercially in Hawaii, and has never been observed to establish a colony on cane plants there, it can live on cane for a number of days. A list is given of the cereals and grasses on which colonies of this Aphid have been observed in Hawaii; some of these are also subject to sugar-cane mosaic.

Tams (W. H. T.). **Notes on some Species of the Genus *Cosmophila* Boisd.**—*Trans. Ent. Soc. London*, 1924, pt. 1–2, pp. 20–24, 3 pls. London, 30th August 1924.

The use of the generic name *Cosmophila* can only be settled after a revision of the whole *Anomis* group; it is employed here as it unquestionably applies to the insects considered, and it may prove necessary to retain it for them instead of treating them as species of *Anomis*.

The name that has been most frequently used for all the species of *Cosmophila* is *C. erosa*, Hübn.; this moth is, however, confined to the New World. *C. flava*, F., occurs throughout the tropics, with the geographical races, *C. flava flava* in the Old World and *C. flava fimbriago*, Steph., in the New.

Generally speaking, *C. flava* always occurs with another species, thus *C. flava fimbriago* is found in the New World with *C. erosa*, whilst *C. flava flava* occurs throughout the Indo-Australian region with *C. lyona*, Swinh., and in Africa and Madagascar with *C. auragoides*, Guen.

Copeland (E. B.). **Rice.**—8vo, xiv+352 pp., 28 pls. London, Macmillan & Co., Ltd., 1924. Price 20*s*.

The chapter of this book dealing with pests and diseases of rice contains a very useful compilation of information on all insects known to cause serious injury to rice in various parts of the world. It is a general principle that the more extensively and continuously any crop is planted, the more it is likely to be the prey of epidemic diseases and pests. Rice is one of the most widespread of crops, and is certainly the crop by far the most continuously planted over single great areas. It is therefore remarkable that it has never been destroyed as an industry in any country, as coffee has been; nor does it suffer such serious damage as many other crops. The explanation is probably

not that rice is more immune than, for example, wheat, but is rather to be found in the different methods of culture. Commonly transplanted, and always harvested by hand where its culture is old and intense, rice has been comparatively easily and naturally guarded against epidemics without recourse to any particular measures against pests.

So far no insect pest of growing rice is known to have been transported with the crop across the ocean. Fungi have been so transported, but insects have no stage in which they can be carried with the seed for any length of time without being seen. Several insects are found, however, over almost all the indigenous rice areas, where 97 per cent. of the world's crop is raised; and the total damage done by insects is materially greater than that done by fungi.

OKUNI (T.). **Insect Pests of the Poppy in Formosa. Part 3.**—*Res. Inst. Dept. Agric., Formosa*, Bull. 19, pp. 1–25. August 1924.

Siphonaphis padi, L. (*Rhopalosiphum avenae*, F.) feeds on the roots of poppy, causing serious damage during the winter, at Toychara, Formosa.

OKUNI (T.). **Insect Pests of Stored Grains in Formosa. Part I.**—*Res. Inst. Dept. Agric., Formosa*, Rept. no. 9, pp. 1–166, 4 pls. August 1924.

There are about 30 species of insects in Japan that are injurious to stored grain. This report deals with *Bruchus chinensis*, L., and *Calandra oryzae*, L. All stages of both beetles are found throughout the year in Formosa. There are about 2 generations of *B. chinensis*. The incubation period lasts 3–15 days, and more than 90 per cent. of the eggs hatch. The larval period lasts 13–33 days, and there are 4 moults. The pupal stage lasts 3–17 days. The males outnumber the females and live a little longer; one female lays about 89 eggs during life. The principal stored peas and beans infested are *Phaseolus* spp., others being *Cajanus indicus*, *Vigna catjang* var. *sinensis*, *Pisum sativum* and *Vicia faba* var. *equina*.

C. oryzae has 8 generations a year. Eggs laid in August hatch in 3–4 days. The larval stage lasts 21–24 days in late summer, and there are 4 moults. The pupal stage lasts 5–20 days. The females oviposit about 3 days after mating and produce 112–246 eggs during life. The longevity of the adults is about 160 days on an average.

TAKASUGI (T.). **Studies on *Bruchus chinensis*, L.—Insect Pests of Stored Products. Part II.**—pp. 1–12, 1 pl. Plant Quarantine Station, Yokohama, June 1924.

Bruchus chinensis, L., is one of the most injurious pests of various stored peas in Japan. The eggs are laid on the surface of the peas and hatch in 6–9 days. The larvae feed on the peas, the first two instars lasting 3–5 days and the third 4–5. Pupation takes place within the peas, the pupal stage lasting 2–5 days. The males are active and mate many times, the females are rather inactive. They mate some hours after emergence, and oviposition takes place from some hours to 1 day later, each female depositing 70 or 80 eggs during 5 or 6 days. In Yokohama there are 5–7 generations a year. Hibernation occurs in the larval stage, and in the warmer districts in the adult stage as well. The hibernating larvae pupate from the end of April onwards.

TAKAHASHI (R.). **Some Aphididae from the Far East.**—*Philippine Jl. Sci.*, xxiv, no. 6, pp. 711–717. Manila, June 1924.

The distribution of a number of species is discussed, including *Macrosiphum rosae*, L., on *Rosa* sp., *Rhopalosiphum pseudobrassicae*, Davis, on *Brassica oleracea*, and *Aphis gossypii*, Glov. (of which *Toxoptera leonuri*, Tak., from *Leonurus sibiricus* in Formosa is a synonym), on *Colocasia antiquorum*, all recorded for the first time from China ; *A. rumicis*, L., on *Rumex* sp., recorded for the first time from Sakhalin ; *Myzocallis querciformosanus*, Tak. (of which the winged viviparous female is described), on leaves of *Quercus dentata*, recorded for the first time from Japan ; *Kurisakia juglandicola*, gen. et sp.n., on *Juglans sieboldiana* from Japan ; and *Dilachnus quercihabitans*, sp. n., on *Quercus serrata* from Korea.

P.V. **Insecticides végétaux d'Extrême-Orient** (*Derris elliptica* et *D. uliginosa*).—*Bull. écon. Indochine*, xxvii, Renseignements, May 1924, pp. [255–257]. Hanoi, 31st July 1924. [Received 7th October 1924.]

An account is given from various sources of the value of derris as an insecticide and of the method of its cultivation under Malayan conditions. *Deguelia* (*Derris*) *uliginosa* and *D. elliptica* occur in Indo-China.

BRAEMER (P.) & BLOCH (A.). **La Désinsectisation par la chloropicrine. Traitement des semences de maïs.**—*Bull. écon. Indochine*, xxvii, no. 166, pp. 261–265. Hanoi, 1924.

Maize seed in small quantities is stored by the native growers of Indo-China in jars, under a layer of several centimetres of wood ash. This method is, however, impossible for large quantities, and fumigation with chloropicrin has, therefore, been tried. Maize seed badly infested with weevils was treated in December 1922 with 338 minims (20 c.c.) per 35 cu. ft. for 24 hours, and was quite free from weevils after 45 days, when examination was made. The germinating power was, however, considerably reduced. As the development of *Calandra oryzae* requires about 45 to 50 days in tropical countries, it may be concluded that all stages were killed by the above treatment. The same dose applied for 12 and 18 hours seemed to kill adults and larvae but not the eggs ; weaker doses apparently killed the adults only. In February and early March two fumigations were made with a 15 days' interval, using 84·5 minims (5 c.c.) per 35 cu. ft. for 24 hours, but living weevils still remained after 10 and 20 days ; these seeds were so badly infested that germination tests were useless. A further test was made in late July, a few weeks after the crop was gathered, and before the weevils had begun to be very numerous. The results showed that a dose of even 84·5 minims for 24 hours was sufficient to clear lightly infested seeds, provided that they were subsequently kept free from further attack ; moreover, this dosage seemed to have practically no effect on germination. Sacks of flour infested with weevils and tobacco infested with Anobiids (the larvae of which pierce small holes in cigars) were also successfully treated with the 84·5 minim dose, and no disagreeable flavour was left in the products.

Senior-White (R.). **Catalogue of Indian Insects. Part 4.—Trypetidae (Trypaneidae).**—33 pp. Calcutta, Govt. India Cent. Pubn. Branch, 1924. Price *As.* 8 or 9*d.*

This is a list of the known Trypetids of India, with their synonyms, and is based on Bezzi's monograph of 1913 [*R. A. E.*, A, i, 328].

Kunhikannan (K.). **Coffee Borer.**—*Planters' Chron.*, xix, no. 37, pp. 627–628. Coimbatore, 13th September 1924.

As the materials used for washing coffee stems have proved unreliable owing to variation in their chemical composition, other methods of controlling the coffee borer [*Xylotrechus quadripes*] have been tried. The tests included hand-picking the adult beetles during the period of flight, and wrapping the stems with strips of date-palm matting, old newspapers and "Thermogen." Hand-picking proved the cheaper, easier and more effective method. The results were so satisfactory that it is hoped to work on the same lines on other estates, that is, the management of the estate paying for the labour, the State furnishing trained supervision of the work. This method should also be tried in other localities, with different elevation and rainfall, to determine whether the beetles can be as easily caught under all conditions.

[Hutson (J. C.).] **Ceylon Entomology.**—*Trop. Agriculturist*, lxiii, no. 2, pp. 91–93. Peradeniya, August 1924.

This is an extract from the Progress Report of the Government Entomologist for the second quarter, 1924. Owing to the difference in the construction of the galleries of *Xyleborus coffeae* in Java and *X. fornicatus* in Ceylon it would be useless to introduce the Chalcid parasite of the former into Ceylon for the control of the latter. *X. fornicatus* has recently been recorded as attacking cinchona in Bengal, the only previous record of its occurrence in India being in *Ricinus communis* at Bangalore. *Calotermes greeni* was found to be infesting a dead branch of a dying *Grevillea* tree growing among tea, though it was not found attacking the latter. Experiments with various paint mixtures and wound dressings are being continued. At present the following programme is recommended for the control of the scavenging termites: careful and thorough pruning, including the scraping out of all the dead wood in exposed surfaces, followed by the application of Bordeaux mixture, if branch canker has been prevalent, and by the careful application of coal tar to all wounds and exposed surfaces. All mounds and underground nests in and around tea fields should be destroyed; the simplest method is to dig them out and destroy the queens and as many of the other inmates as possible.

Other tea pests recorded are *Homona coffearia* and *Natada nararia*, which may be controlled in the early stages of an outbreak by the application of lead chromate by the spraying or sprinkling method; *Saissetia hemisphaerica*; and *Piesmopoda rufimarginella* (leaf skeletoniser). *Nephantis serinopa* occurred on coconuts.

The investigations on some of the insects of vegetable crops are being continued, the insects listed as additional to those mentioned in the report for the first quarter [*R. A. E.*, A, xii, 372] are the larvae of *Dichocrocis megillalis*, *Arcilasia plagiata* and *Nygmia* sp., and the beetles, *Epilachna vigintioctopunctata* and *Mylloceras* sp., attacking

the leaves of brinjal (*Solanum melongena*), and the larvae of *Leucinodes orbonalis* boring into the fruits. The leaves of cucurbitaceous plants were attacked by a Criocerid beetle, *Lema* sp., and those of tomato by the larvae of *Prodenia litura* and *Phytometra* (*Plusia*) *chalcytes*, the latter being heavily parasitised by a Hymenopteron. *Hibiscus esculentus* was attacked by the larvae of *Sylepta derogata* (cotton leaf folder), which were heavily parasitised by Hymenoptera; *Nisotra badia* was also prevalent on this plant. Chillies (*Capsicum* spp.) were infested with Aphids, which were, however, controlled by the usual natural enemies. *Eupterote geminata* was recorded from experimental cotton plots; and *Hypsipyla robusta* (toon shoot-borer) is being studied.

A Preliminary List of the Pests of Cultivated Plants in Ceylon.—*Dept. Agric. Ceylon*, Bull. 67, 68 pp. Peradeniya, December 1923. [Received 29th September 1924.]

The pests are grouped under their food-plants, which are mainly the economic and cultivated plants of Ceylon, though a few related wild plants have also been included. The majority of the insects listed are definitely known to be injurious, and, where possible, the nature of the injury, or the part of the plant attacked, as well as the injurious stage of the insect, have been indicated.

Arisz (W. H.). **Verslag over het jaar 1923.** [Report of the Besoeki Experiment Station for 1923.]—*Meded. Besoekisch Proefst.*, no. 36, 63 pp. Djember, 1924.

Caterpillar pests of tobacco gave little trouble owing to the general use of lead arsenate sprays. It was repeatedly observed that infection of tobacco by *Phytophthora* followed infestation by the tobacco stem borer [*Phthorimaea heliopa*]. The green aphis [*Myzus persicae*] was abundant during the prolonged dry weather and led to many tobacco leaves being injured by birds.

A series of circulars, issued during 1923, are given as addenda. In no. 6, dated 24th May 1923, attention is called to the fact that unless all the red coffee berries are plucked as quickly as possible, other measures against the coffee berry borer [*Stephanoderes hampei*] are nugatory. In no. 12, dated 20th September 1923, stress is laid on the dangerous character of blackened berries as compared with infested green ones of which the bean is still watery. Red and yellow berries with hard beans are likewise dangerous. In the Besoeki district in 1923, the practice of "rampassen" [*R. A. E.*, A, x, 506] did not prove advantageous, and planters are asked not to proceed with this measure without consulting the experiment station.

Bally (W.). **Insterving bij Hevea, veroorzaakt door een Wantsenplaag.** [Dieback in *Hevea* caused by a Bug.]—*Meded. Proefst. Malang*, no. 49, 10 pp., 12 figs. Soerabaya, August 1924. (With a Summary in English.)

For about two years *Hevea* in a Javanese plantation adjoining forests has suffered from dieback, and this seems almost certainly to be due to the punctures of a bug, probably the Pyrrhocorid, *Dindymus rubiginosus*. The injury has a marked resemblance to that caused on *Coffea arabica* by the Pentatomid, *Pentatoma plebeia*.

Schwarz (M. B.). *Botrytis stephanoderis* **sp. n. Bally und** *Botrytis bassiana* **Bals.**—*Bull. Jard. Bot. Buitenzorg*, Ser. 3, vi, pp. 68–69, 1924. (Abstract in *Rev. App. Myc.*, iii, pt. 9, p. 516. Kew, Surrey, September 1924.)

The fungus, *Botrytis stephanoderis*, attacking *Stephanoderes hampei*, Ferr. (coffee berry borer) in the Dutch East Indies [*R. A. E.*, A, xi, 169], does not differ sufficiently from *B. bassiana* to justify its being treated as a separate species, the differences observed being probably the result of protracted subculturing. The fungus has also been isolated from the larvae of *Brachartona* sp. and of the white rice-borer [*Scirpophaga sericea*, Sn.].

De Jong (A. W. K.). **Verslag [Report] van den Directeur van het Algemeen Proefstation der A.V.R.O.S. 1 Juli 1923–30 Juni 1924.**—*Meded. Algem. Proefst. A.V.R.O.S.*, Algem. Ser. no. 18, 25 pp. Medan, 1924.

The injury to oil-palms by locusts, which occurred as in the previous year [*R. A. E.*, A, x, 543], can be avoided by not planting out palm seedlings under 1 year of age and by not sowing *Mimosa* before the palms are in the field. Leaf-eating caterpillars, especially a large bagworm, *Mahasena* sp., injured the palms. Though the defoliation that sometimes resulted did not kill them, the fruit dropped. A coconut estate was infested with *Oryctes rhinoceros*, but energetic measures checked this pest. The caterpillars of *Hidari irava* did much harm on one coconut estate. In the case of old palms no measures are feasible, except furthering the development of natural enemies by collecting the caterpillars in gauze-covered boxes.

Kalshoven (L.). **Para-dichlorobenzene, een middel tegen insecten aan wortel en stamvoet van boomen.** [Paradichlorobenzene, a Remedy against Insects on the Roots and Foot of the Stem of Trees.]—*Teysmannia*, xxxiii, no. 7–8, pp. 338–343. Batavia, 1922. [Received 7th October 1924.]

Attention is drawn to the possible value of paradichlorobenzene against such pests as the Hepialid, *Phassus damor*, Moore, the Cossids, *Zeuzera postexcisa* and *Z. coffeae*, and the termite, *Coptotermes gestroi*, which infests *Hevea*.

Fleuren (J. F.). **De rijstmot in de magazijnen op Billiton.** [The Rice Moth in the Warehouses in Billiton.]—*Teysmannia*, xxxiii, no. 10, pp. 461–465. Batavia, 1922. [Received 7th October 1924.]

Large quantities of rice are stored in Billiton, and in recent years *Sitotroga cerealella*, Oliv., has appeared in the warehouses. In one instance, 3 per cent. of the rice was lost as the result of an infestation that was in its very earliest stage, the rice being examined daily. In

this case a thorough cleaning and whitewashing of the store did not check the infestation. Large numbers of moths can be trapped in trays half full of water on which a film of coconut oil has been poured. These traps seem more effective if the store is in darkness.

In a supplementary note P. van der Goot points out that fumigation, with carbon bisulphide for instance, of the warehouses and of all parcels of rice seems the best measure. Possibly prolonged exposure of infested rice to direct sunshine may kill the pests. Psocids are also found in infested rice, but are secondary pests living on the debris produced by the larvae of the moth.

KALSHOVEN (L. G. E.). **Zoologische bijdragen. 8. Boorders in woengoevruchten.** [Zoological Contributions. 8. Borers in the Fruit of *Lagerstroemia*.]—Reprint, 7 pp., 2 figs., from *Tectona*, xvii, p. 455. Buitenzorg, May 1924. (With a Summary in English.)

Two fruit-borers infesting *Lagerstroemia speciosa* are briefly described. The Curculionid, *Ctenomerus lagerstroemiae*, Mshl., inserts its eggs in the skin of the fruit, apparently before it has hardened. The larvae tunnel through the seed-mass, filling the mine with frass and pupating in a globular cell against the axis of the fruit. When the ripe fruit opens and the contents are shed, the pupal cells remain attached to the axis, and the weevils appear to emerge subsequently. Each larva eats from 5 to 15 seeds, though a considerable number of sound seeds is left.

A more injurious borer is a Pyralid larva as yet unidentified, which spins the fruits together and destroys the greater part of their contents. The pupa rests in a white cocoon inside the fruit. If young fruits are attacked, they cannot develop normally.

A combined infestation by both borers may result in the destruction of a large part of the seed crop, and if the fruits are wanted in large quantities for forest plantations, samples should be collected first and examined in order to ascertain the amount of sound seed available.

OTANES (F. Q.). **Soap as an effective Contact Insecticide for the Philippine Migratory Locust.**—*Tropical Agriculturist*, lxiii, no. 2, pp. 84–88. Peradeniya, August 1924.

The various preparations that have been tested in the Philippines against locusts [*Locusta migratoria*] have either been too expensive for general use or not efficacious. Laboratory experiments with soap solution gave promising results, which were later confirmed by field trials. The solution now generally recommended is soft soap, 1 lb. to 4 gals. water, this having given satisfactory results during an invasion in 1923. The soap used was a yellow Chinese soap, and it was applied with a bucket spray pump and rubber hose. The kind of soap and concentration are important factors in the efficacy of this method. The insects must be thoroughly covered. If well sprayed, though some individuals may apparently revive, they generally succumb to the action of the soap later.

CORBETT (G. H.). **Annual Report of the Government Entomologist, for 1923.**—*Malayan Agric. Jl.*, xii, no. 8, pp. 252–259. Kuala Lumpur, August 1924.

On several occasions the growing of cover crops has proved dangerous; thus a serious outbreak of the locust, *Valanga nigricornis*, Burm., occurred on young coconut palms growing in a cover crop of mimosa, whilst adjacent areas where no mimosa was growing were entirely free. *Hypomeces squamosus*, F., and *Adoretus compressus*, Weber, are particularly injurious where the soil is not kept clean. *Batrachedra arenosella*, Wlk., which infests coconut flowers in the unopened spike, is not so serious as was supposed, the large number of falling flowers and immature coconuts being due to other causes. *Tirathaba* sp. near *trichogramma*, Meyr., is an important pest of the coconut flowers of the opened spike, and the caterpillars have frequently been found boring the female flowers. Experiments in its control are still in progress and show promising results. Two Ichneumonid parasites have been discovered, *Campoplex* sp. and *Anilasta* (?) sp.

Detailed investigations have been made on various insects during the year, including *Dysdercus cingulatus*, F., on cotton; in this connection it was found that another Pyrrhocorid, *Antilochus coqueberti*, F., is a natural enemy of some importance of the former species, upon which it feeds. The nymphs of *D. cingulatus* were found to be predacious on sickly or dying individuals of their own species.

A long list is given of the more important insects recorded during the year arranged under orders and stating the food-plants.

VON IHERING (R.). **O caruncho da cereja do café.** [The Coffee Berry Worm.]—*Chacaras e Quintaes*, xxx, no. 2, pp. 111–114, 4 figs. S. Paulo, 15th August 1924.

A brief account is given of the coffee berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.) and the injury done by it. In order to save the 900 million coffee bushes in S. Paulo, it is suggested that the planters should accept the temporary loss involved in pruning the bushes down to the ground in order to eradicate the pest by removing all opportunities for breeding. It is argued that the resultant losses cannot be greater than the total of those that are bound to occur during a period of years while less radical measures are being applied.

BONDAR (G.). **Aphidideos brasileiros.** [Brazilian Aphids.]—*Chacaras e Quintaes*, xxx, no. 2, pp. 115–116, 1 fig. S. Paulo, 15th August 1924.

A brief description is given of an Aphid, *Brasilaphis bondari*, Mordv., recently described from specimens taken by the author on an unidentified plant in the south of Bahia. Hitherto there was no proof of the existence of indigenous Brazilian Aphids.

BONDAR (G.). **Verrugas nas folhas da mandioca.** [Galls on the Leaves of Cassava.]—*Chacaras e Quintaes*, xxx, no. 2, pp. 119–120, 2 figs. S. Paulo, 15th August 1924.

The subject matter of this article on *Eudiplosis brasiliensis*, Rbs., infesting cassava is substantially the same as that of one already noticed [*R. A. E.*, A, xii, 413].

Bondar (G.). **Percevejos do cacaoeiro.** [Bugs attacking Cacao.]—*Correio-Agric.*, ii, no. 8, pp. 234–235, 1 fig. Bahia, August 1924.

Two Pentatomid bugs, *Dinocoris macraspis*, Perty, and *D. amplus*, Walk., attack cacao in the State of Bahia. The former also infests kola. They are not active, and can be caught and crushed by hand.

A. A. **A *Phylloxera vastatrix* no Rio G. do Sul.** [*P. vastatrix* in Rio Grande do Sul.]—*Correio-Agric.*, ii, no. 8, p. 235. Bahia, August 1924.

Phylloxera vastatrix, Planch., is reported as attacking vines in Rio Grande do Sul, and regulations prohibiting traffic in grape vines from that State to other parts of Brazil are now in force.

Insect Pests and Plant Diseases.—*Rept. Agric. Dept. Grenada 1923*, p. 3. Grenada, 1924.

The cotton-stainers, *Dysdercus delauneyi*, Leth., and *D. fernaldi*, Ballou, were rather less prevalent than usual during 1923. Red ring of coconuts, caused by *Aphelenchus cocophilus*, Cobb, occurred more or less wherever young trees are grown. *Aspidiotus destructor*, Sign. (coconut scale) was fairly prevalent, probably on account of the intense drought. The cacao thrips (*Heliothrips rubrocinctus*, Giard) was somewhat troublesome locally, but was kept down by proper cultivation and the use of a 2 per cent. mixture of lime. *Scapteriscus vicinus*, Scud. (*Gryllotalpa didactyla*, Latr.) was troublesome on vegetables, but was checked by the use of Criddle mixture. *Alabama argillacea*, Hb. (cotton worm) was somewhat destructive to cotton leaves late in the year; dusting with 1 part Paris green to 6 parts slaked lime gave satisfactory results. *Araecerus* (*Araeocerus*) *fasciculatus*, DeG. (nutmeg and mace weevil) was less prevalent than in the preceding year, probably owing to better sanitation being maintained in the storage receptacles. *Diatraea saccharalis*, F. (sugar-cane moth borer) was a severe pest in two localities. The remedies were collection of eggs and cutting out infested canes and using them as food for cattle. The Chalcid parasite, *Trichogramma minutum*, Riley (*pretiosum*, Riley), was not observed.

Work in connection with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept. St. Kitts-Nevis 1922–23*, pp. 11–12 & 43–44. Barbados, 1924.

The occurrence of mosaic disease of sugar-cane is a great menace to the industry on Nevis Island, and growers are called upon to dig out and destroy all affected plants, in accordance with the Plant Protection Ordinance. The cotton worm [*Alabama argillacea*] was only injurious in the windward part of the island and then not to a great extent. The leaf blister mite [*Eriophyes gossypii*] was much more prevalent on cotton than of recent years. *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) was severe in its attacks; in some places from 66 to 88 per cent. of the second crop was damaged. It is considered that if the old cotton fields are thoroughly cleaned up, and the daily fumigation of cotton seed at the ginneries satisfactorily carried out, the presence of this pest should not seriously affect the cotton industry of the Island.

In St. Kitts, *A. argillacea* was abundant during the season and large amounts of insecticides were used to keep it in check. The close season for cotton resulted in a great decrease in *E. gossypii*.

Tower (W. V.). **Report of the Entomologist.**—*Repl. Porto Rico Agric. Expt. Sta., Mayaguez, 1923*, pp. 11–15. Washington, D.C., July 1924.

Considerable time has been spent by the entomologist in fumigating tobacco warehouses and factories with hydrocyanic acid gas against *Lasioderma serricorne*, fully 4,750,000 cu. ft. of space being treated. The warehouses were treated with 40 oz. of sodium cyanide per 1,000 cu. ft. for 48 hours. As a result there has been a considerable reduction in the loss caused by this beetle in cigars.

The purple scale [*Lepidosaphes beckii*] and the rufous scale [*Chrysomphalus* sp.] were injurious where the citrus plantations had been previously sprayed with Bordeaux-oil emulsion. Mites are also troublesome after this spray has been used. During 1922 cotton was severely injured by cutworms and by *Alabama argillacea*. Spraying should be done as early in the morning as possible, while the air is still. Dusting is not advocated on account of the absence of dew and the occurrence of high winds, but poison baits have given good results. Nicotine sulphate and soap killed all Aphids, leafhoppers, caterpillars and other insects feeding on sweet maize. The striped cucumber beetles, *Diabrotica innuba* and *D. bivittata*, which attacked melons and cucumbers during the winter months, were controlled by a spray of Bordeaux (2–3–50) and 1½ lb. lead arsenate. These beetles were present in large numbers in soy bean experimental plots during the summer.

Menéndez Ramos (R.). **El pulgón amarillo de la caña.** [The Yellow Sugar-cane Aphis.]—*Rev. Agric. Puerto Rico*, xi, no. 4, pp. 23–27, 1 pl. S. Juan, P.R., October 1923. [Received 10th October 1924.]

No action is advised in Porto Rico in the majority of cases against the yellow aphis of sugar-cane [*Sipha flava*], owing to its natural enemies. In exceptional cases a spray of petroleum-soap emulsion may be used.

Chittenden (F. H.). **The Amaranth Curculio,** *Conotrachelus seniculus*, **Lec.**—*Jl. N.Y. Ent. Soc.*, xxxii, no. 3, pp. 119–121. New York, September 1924.

A variety of cultivated amaranth (*Amaranthus* sp.) has been seriously injured at Washington, D.C., by the weevil, *Conotrachelus seniculus*, Lec. Large numbers of larvae were found feeding around the base of the plant, where also pupation occurred. A form of root rot was noticed that might have attacked the plants after the insects had been at work. The first adult was reared on 28th September, and adults continued to appear until the end of October. This species is easily confused with *C. elegans*, Say (pig-nut leaf weevil); the distinguishing features are given.

Revised Rules and Regulations Supplemental to Notice of Quarantine No. 45.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 8 pp., 1 map. Washington, D.C., 12th July 1924.

These regulations against the gipsy moth, *Porthetria dispar*, and the brown-tail moth, *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*), which became effective on 1st July 1924, supersede previous ones, prescribe the lightly infested and generally infested areas of the quarantined States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut, and regulate the movement and inspection of specified plants and other articles and the cleansing of the vehicles used in their transport.

Woglum (R. S.). **The Value of Sprays compared with Fumigation for the Resistant Black Scale.**—*California Fruit Growers' Exchange*, Field Dept. Circ. 118, 4 pp. Los Angeles, Cal., 17th July 1924.

In most parts of southern California the black scale [*Saissetia oleae*, Bern.] can be successfully controlled by fumigation, and it should continue to be the preferred method. In those parts of the State, however, where a single annual fumigation is not sufficient, it should be followed by an oil and lime-sulphur spray. The value of different proprietary brands is compared; this varies in some cases with the time of application.

Fulton (B. B.). **The European Earwig.**—*Oregon Agric. Coll. Expt. Sta.*, Sta. Bull. 207, 29 pp., 6 figs. Corvallis, Oregon, August 1924.

Forficula auricularia, L. (European earwig) was introduced into Oregon in 1909. Since that time it has become a very troublesome pest, particularly in houses, besides injuring garden vegetables and flowers and sometimes bush and tree fruits. Its life-history and habits are described, and poison baits are recommended for its control [*R. A. E.*, A, xi, 429, 485]. As no effective natural enemy seems to occur in Oregon, an effort will be made to introduce parasites from Europe.

Brittain (W. H.). **The Apple Sucker** (*Psyllia mali*, **Schmidberger**).—*58th Ann. Rept. Fruit Growers' Assoc. Nova Scotia 1922*, pp. 23–34. Kingston, N.S., 1922. [Received 10th October 1924.]

A full account is given of *Psylla* (*Psyllia*) *mali*, Schmidb. (apple-sucker), as occurring in Nova Scotia, with suggestions for its control.

Sanders (G. E.). **The Past Season's Results from Spraying and Dusting in the Annapolis Valley.**—*58th Ann. Rept. Fruit Growers' Assoc. Nova Scotia 1922*, pp. 95–108. Kingston, N.S., 1922. [Received 10th October 1924.]

The results of dusting in 1922 are recorded and compared with those of liquid sprays.

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KELSALL (A.). **Insecticide and Fungicide Developments.**—*60th Ann. Rept. Fruit Growers' Assoc. Nova Scotia 1924*, pp. 38–44. Kingston, N.S., 1924.

The insecticide developments in orchards during the last year or two are reviewed, and the use of lime-sulphur as a spray is discussed, as well as the effect of sulphur dust on soil acidity, the use of spreaders and stickers, combining dusts and sprays, and new methods of making Bordeaux-arsenic dust. The most familiar and commonly used Bordeaux-arsenic dust is blue when moistened with water. A green dust is made from burnt lime, copper sulphate and white arsenic, while a brown dust is made from burnt lime, copper sulphate and arsenic acid. In the control of biting insects all three dusts gave very similar results, being all highly effective against leaf-eating insects such as tent caterpillars [*Malacosoma*], the green dust, perhaps, proving somewhat superior to the others. Against such insects as the codling moth [*Cydia pomonella*, L.], budmoth [*Eucosma ocellana*, F.], and the green fruit-worm [probably *Graptolitha bethunei*, G. & R.] none of them was so effective as sulphur-lead arsenate dust. The fungicidal value of these dusts is also compared. Wettable sulphur sprays have been found somewhat difficult to prepare, as the sulphur alone refuses to mix with water; a formula recommended is about 67 per cent. superfine sulphur, 30 per cent. hydrated lime and 3 per cent. calcium caseinate, this mixture to be used at from 30 to 50 lb. per 100 gallons, with the addition of 2 lb. lead arsenate. The ingredients should be mixed beforehand in a dust mixer. This mixture costs about the same, or very little more than the standard 3 : 10 : 40 Bordeaux, is quite harmless to foliage or fruit and is superior in the control of all insects. Growers are particularly advised to try it against *E. ocellana* or the green fruit-worm. It is also considered advisable to use this wettable sulphur spray in the regular spray calendar in place of the soluble sulphur spray hitherto used.

BRITTAIN (W. H.). **The Orchard Pest Situation in 1923.**—*60th Ann. Rept. Fruit Growers' Assoc. Nova Scotia 1924*, pp. 64–78. Kingston, N.S., 1924.

The green apple bug [*Lygus communis* var. *novascotiensis*], which has been somewhat checked in recent years by a fungus, is now greatly on the increase. Its control by artificial means is very difficult, but good results were obtained by using a dust of 4·7 per cent. nicotine sulphate, 75·3 per cent. hydrated lime and 20 per cent. pulverised quick lime. Under favourable conditions this treatment practically freed the orchards within a very short time. Any such process is, however, expensive, and as some varieties of apple are far more susceptible to attack than others, it might be sufficient to spray or dust only those varieties that show serious injury. *Lygidea mendax* (red bug) is also troublesome, and can be controlled by the same treatment as for the green apple bug, but as it emerges somewhat later, treatment must be given after blossoming, which is rather late for *Lygus*. *Aphis pomi* (green apple aphis) appeared in numbers, causing severer infestation than any since 1913, but was eventually checked by a fungus. Contact dust did not give as good results against this insect as against the others tested, but the regular liquid spray of nicotine

sulphate and soap, properly applied, proved satisfactory. The apple-sucker [*Psylla mali*] is not often sufficiently important to render spraying necessary, except in relation to possible injury from Bordeaux mixture [*R. A. E.*, A, xi, 394]. The results of dusting experiments against *Rhagoletis pomonella* (apple maggot) are shown in a table; sulphur-lead arsenate and lime-lead arsenate were particularly effective.

Studies in connection with the strawberry weevil [*Anthonomus signatus*] have been continued [*loc. cit.*]. Its distribution, the character of the injury caused, the factors influencing the severity of outbreaks, and its prevalence at various times are discussed, and the life-history under Nova Scotia conditions is given. From control experiments tried in 1923, the results of which are shown in a table, it seems evident that there is no advantage in applying dust until the work of the insect is evident. It is only during fine, warm weather that injury is likely to warrant treatment, and it may be advantageous to treat one side or end of a plantation only. The supposed injury from dusts is discussed; investigation has shown no relation between dusting and the occurrence of rot.

KEENAN (W. N.). **The Brown Tail Moth in Nova Scotia.**—*60th Ann. Rept. Fruit Growers' Assoc. Nova Scotia 1924*, pp. 97–100. Kingston, N.S., 1924.

The history of the appearance of the brown-tail moth [*Nygmia phaeorrhoea*, Don.] in Canada is traced. The insect is kept in check by constant scouting and inspection, but the fact that a certain number of nests are found in Nova Scotia each year shows that it is capable of maintaining itself, and might be able to reproduce in large numbers if allowed to multiply unchecked. Infestation has as yet never been observed in a forest in Nova Scotia, but only on old apple trees.

DUSTAN (A. G.). **The Control of the European Apple Sucker by means of a Parasitic Fungus.**—*60th Ann. Rept. Fruit Growers' Assoc. Nova Scotia 1924*, pp. 100–104. Kingston, N.S., 1924.

An account is given of the natural control of the European apple-sucker [*Psylla mali*, Schmidb.] in Nova Scotia by the fungus, *Entomophthora sphaerosperma*, and of the means adopted for its artificial spread [*R. A. E.*, A, xi, 157]. During 1923, rearing the fungus in cages was started, with the result that the disease was observed three weeks earlier than it had ever appeared in the field. Fresh methods were used also in disseminating the fungus in more widely separated and carefully spaced spots. During the two seasons that the fungus has been used very satisfactory results have been obtained, with a marked reduction in the number of insects.

CURRAN (C. H.). *Rhagoletis symphoricarpi*, **a New Trypaneid from British Columbia (Dipt.).**—*Canad. Ent.*, lvi, no. 3, pp. 62–63. Orillia, Ont., March 1924.

Rhagoletis symphoricarpi, sp.n., here described from British Columbia, was previously thought to be only a race of *R. pomonella*, Walsh [*R. A. E.*, A, vii, 186]. The characters of both sexes and also of the female of *R. zephyria*, Snow, are discussed. *R. symphoricarpi* does not attack apple, but confines itself to the berries of *Symphoricarpus racemosus* (snowberry). Records of these Trypetids have previously all been included under *R. pomonella*.

Curran (C. H.). *Rhagoletis pomonella* **and two allied Species (Trypaneidae, Diptera).**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 56–57, 4 figs. Toronto, 1924.

The author gives a brief account of a Trypetid in British Columbia, previously supposed to be *Rhagoletis pomonella*, Walsh [*R. A. E.*, A, vii, 186], but now recognised as *R. symphoricarpi* [see preceding paper], with notes on *R. zephyria*, Snow, described from California. The food-plant of the latter is not yet known.

Cosens (A.) & Hudson (H. F.). **Reports on Insects of the Year.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 9–11. Toronto, 1924.

In addition to the commoner insects recorded from parts of Ontario during the year were the leaf-rollers, *Anacampsis populella*, Clem., feeding on the foliage of the large-toothed aspen (*Populus grandidentata*) and *Tortrix* (*Cacoecia*) *hewittana*, Busck, on elm (*Ulmus americana*). The Hymenopteron, *Pelecinus polyturator*, Drury, which is said to parasitise the larvae of May beetles [*Lachnosterna*], was abundant locally during August.

Robertson (H. A.). **The Rose Curculio in Manitoba—with Notes on other Insects affecting Roses.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 12–16, 4 figs. Toronto, 1924.

Rhynchites bicolor, F. (rose curculio) causes considerable damage to roses in Manitoba by puncturing the buds so that the petals do not open. Generally the injury is not noticed until too late, as the insects are very small and elusive. The adults begin to appear at the beginning of June and are most abundant by the middle of the month. The eggs are laid in the punctures, generally only one to each bud. Hatching begins in the second week in July, and the larvae live for a short time within the flowers and then go to the hips, where they are found in late August feeding on the seeds. From about 4th September the larvae bore their way out of the hips, fall to the ground and bury themselves about 1½ to 4 inches below the soil surface, where they hibernate. In the middle of the following May pupation begins, and after two weeks the first adults emerge. All native roses as well as various cultivated ones are attacked, though there is great variation in degree of susceptibility. When only small numbers are present, hand-picking, net-sweeping, or shaking into an umbrella is sufficient, but for a severe outbreak heavy applications of spray, using 3 to 5 lb. lead arsenate in 50 U.S. [*sic*] gals. water has given as much as 95 per cent. mortality. When about 20 per cent. of the hips in autumn are found infested with larvae, spraying might well be begun in the following June. If all the hips are picked and burnt before 1st September, the larvae will be destroyed before descending to the ground.

Other insects observed injuring roses include the Scarabaeid, *Dichelonyx backi*, Kay, which feeds on the foliage, the Halticid, *Haltica tombacina*, Mann., the Chrysomelid, *Calligrapha lunata*, F., and a Trypetid fly, *Spilographa setosa*, Doane, which in the larval stage inhabits rose hips in autumn, frequently in association with *R. bicolor*, but injuring the juicy outer wall rather than the seeds. This fly descends to the ground for pupation and emerges the following June. A Hymenopterous parasite has been reared from it.

Criddle (N.). **Two Problems in Natural Control.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 16–18. Toronto, 1924.

The control of the wheat-stem sawfly, *Cephus cinctus*, Nort., is an important problem in Manitoba, where it is now found over the whole wheat-growing area, besides large parts of Saskatchewan and Alberta. When this sawfly left the wild grasses that were its original food for the wheat and rye fields, no parasites accompanied it, so that it was able to spread with great rapidity. Gradually, however, parasites began to invade the new food-plants, at first at the edges of the field ; eventually *Microbracon cephi*, Gahan, spread through the fields, but it will have to make far greater progress before much can be expected from its activities. Other parasites in the grasses have very rarely been recorded from the cultivated crops. A secondary parasite, *Eupelmus allyni*, French, has been reared from *M. cephi*.

Two forest insects very destructive in Manitoba are the forest tent caterpillar [*Malacosoma disstria*, Hb.], which has defoliated more than 100 sq. miles of trees in Saskatchewan, and the fall webworm [*Hyphantria cunea*, Drury], which in some localities is almost equally destructive. These pests have a common parasite, *Itoplectis conquisitor*, Say, while *Ephialtes pedalis*, Cress., has been reared from the former and may be parasitic on both species. *Itoplectis* depends upon at least two hosts for its perpetuation. In semi-wooded country its usual hosts appear to be *Malacosoma fragilis*, Stretch, and certain Tortricids. In the more wooded country it may attack these insects, but readily infests as alternative hosts both *M. disstria* and *Hyphantria textor*, Harris. It is thought that *I. conquisitor* and other parasites will practically eliminate the webworm, but not the tent caterpillars, because the two pests occur in widely separated localities and it is not known what alternative hosts are present in the tent caterpillar region, or whether *Itoplectis* is able to migrate long distances in search of hosts. It might be of great advantage to distribute heavily parasitised *Hyphantria* pupae in the areas infested by *Malacosoma*, or, perhaps better, to introduce healthy webworm pupae as an alternative host for the parasite. It is possible, however, that other hosts may be observed for *Itoplectis*, such as canker-worms and other spring larvae.

Leonard (M. D.). **The Present Status and Distribution of the Apple and Thorn Skeletonizer** (*Hemerophila pariana*, **Clerck, Lepid.**).—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 18–20. Toronto, 1924.

The area infested by *Hemerophila pariana*, Clerck (apple and thorn skeletoniser) in the United States in 1923 is given, with notes on its abundance in various localities. It occurs in New York, Connecticut, Massachusetts, Rhode Island, New Jersey and Vermont, but a supposed record from Canada appears to be erroneous. It seems to prefer apple as a food-plant, but has also been recorded on thorn, pear, peach, sweet cherry and strawberry. In spite of the exposure of the larvae during feeding, their susceptibility to arsenicals and the activities of parasites, all of which should tend to reduce the pest to secondary rank, the damage is sometimes so severe in neglected orchards or roadside trees that thorough, consistent spraying should be practised wherever the pest is present. There were apparently three full generations and

a partial fourth in New York State in 1923. Trees treated with the usual spray schedule for apple are very little damaged ; the calyx spray just after the petals fall seems the most effective, but another application about three weeks later seems to be advisable, or one about the third week in August.

Ross (W. A.). **Miscellaneous Notes on Grape Leafhopper Control.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 24–26. Toronto, 1924.

Further experiments have been made to test the effect of nicotine sulphate on the eggs of the grape leafhopper, *Erythroneura comes* [*R. A. E.*, A, xi, 376], the variety *ziczac* being chiefly employed. Newly-laid eggs were found to be somewhat less susceptible to nicotine than those over 8 days old. Nicotine dust proved unsatisfactory as an ovicide, but the addition of lime apparently increased its effectiveness. Nicotine sulphate 1 : 1200 with 5 lb. hydrated lime in 40 gals. destroys all eggs in all stages of development. The best time for applying the spray is shortly after the over-wintering adults cease oviposition, that is, generally speaking, about one week after the fruit sets. Very effective work can also be done in combining this treatment with sprays for the root worm [*Fidia viticida*] or for the grape-berry moth [*Polychrosis viteana*] ; there is considerable latitude concerning the period of application, and in 1923 treatment from 6th to 21st July was very successful. The advantage of the egg-spray over the nymph spray is that it practically eliminates the second generation, lessens the danger of staining the fruit with Bordeaux mixture, is usually more effective against plant diseases, simplifies spraying operations, and saves material because it is put on before the heavy new growth appears.

McLaine (L.). **The New Regulations under the Destructive Insect and Pest Act.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 27–29. Toronto, 1924.

The legislation against insect pests in Canada since the first enactment of 1894 is reviewed. In 1910 the Destructive Insect and Pest Act was passed, and in 1922 an Advisory Board was created to revise the existing regulations. After two years' work, on 1st September 1923, the new regulations came into effect ; they comprise, besides general regulations, 15 foreign regulations, making special restrictions with regard to certain insect pests, and six domestic quarantine regulations dealing with the movement of nursery stock in Nova Scotia, of maize in Ontario, etc.

Burgess (A. F.). **The Value of Natural Enemies of Injurious Insects.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 30–36. Toronto, 1924.

The possibilities of the biological control of insect pests by the introduction of their natural parasites are briefly reviewed, and in this connection a full account is given of the gipsy moth (*Porthetria dispar*, L.) in North America and of the natural enemies that have been introduced against it and the brown-tail moth, *Nygmia phaeorrhoea*, Dön. (*Euproctis chrysorrhoea*, L.).

The author's summary is as follows : Natural enemies are a powerful means of controlling most insects. Insects imported from foreign lands leave their natural enemies behind, and under favourable conditions

are capable of more rapid increase and destruction than is usual in their native environment. If the major factors favouring control of an insect are to be utilised, it is necessary to make a careful study of the fluctuations of the pest, and the damage done in its native home, preferably before, rather than after, it becomes located in a new country. Until such work has been thoroughly done, so that the prime factors which bring about the natural control of the insect in its native home have been thoroughly determined, it is desirable to secure and colonise all natural enemies that give promise of assisting in the problem of control. While theoretical considerations may sometimes be of value, definite facts are needed as a basis for securing the greatest benefit by natural enemies.

GRAY (H. E.). **The Onion Maggot in Alberta.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 36–38. Toronto, 1924.

Infestation by *Hylemyia antiqua*, Meig. (onion maggot) in Alberta, which had previously occurred only in a few localities, in 1922 became a widespread invasion. The seasonal history is recorded from observations in the field ; there was considerable evidence of a third generation, though this point was not proved. During 1922 crude naphthaline was used on rows of onions after the damage had begun to appear. The mixture of naphthaline and furnace ash was worked into the soil close to the plants and killed 80 per cent. of the maggots in 4 days. Further trials would have been made in 1923, but most of the onions had seeded before treatment could be started. The fact that self-sown and early sown onions were most heavily infested and that eggs were found on them earlier than on any of the other plants shows the possible value of using onions as a trap crop. The later sown onions were almost free from eggs until about the end of the oviposition period of the first generation. It is mostly plants with heavy, flaccid growth that are chosen for oviposition. Self-sown onions or deeply planted seedlings, of which the leaves branch before reaching the surface, are the most heavily infested. The relationship between rainfall and oviposition requires further study ; it has been observed that oviposition was much less active before a storm and ceased until a day or so afterwards.

HAMMOND (G. H.). **The Onion Maggot in the Ottawa District.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 39–41. Toronto, 1924.

The onion maggot [*Hylemyia antiqua*, Meig.] has been an important pest in Ottawa for many years, ovipositing on garlic and leek as well as onion ; eggs on leek have been found abundantly, but fewer larvae matured on garlic or leek. The greatest injury is done in June by the larvae of the first generation. Two distinct generations and a partial third were reared in 1923. Staphylinid beetles, probably *Baryodma ontarionis*, Casey, were predacious on eggs and larvae of *H. antiqua* in confinement and are probably equally so in the field ; the Ichneumonid, *Aphaereta muscae*, Ashm., was reared from first generation pupae in 1923, and the Cynipid, *Cothonaspis gillettei*, Wash., from second-generation pupae. Mites, probably *Microtrombidium* sp., were found attached to adults.

The sodium arsenite poison bait that has been used in Ottawa for several years has not been giving entire satisfaction. As an improvement on the trap-crop method of control, cull onions were planted in soil in flat boxes set 30 ft. apart through fields of seedling onions. It is thought that this method will prove more satisfactory than the poison bait ; a combination of the two systems may ultimately prove to solve the problem of control.

ARMSTRONG (T.). **Onion Maggot Studies in the District of Montreal, Quebec, 1923.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 42–45. Toronto, 1924.

Heavy losses have been experienced by market-gardeners in Montreal from the depredations of the onion maggot [*Hylemyia antiqua*, Meig.]. The seasonal history is described. With regard to the oviposition habits of the flies, it was observed that during spring and summer, until the plants were all 6 to 8 in. high, almost all eggs were deposited in the soil, within an inch or two of the plant. Towards the end of August and during September eggs were commonly laid on the leaves, as many as 8 to 15 being found at one time on a single plant. Plants previously attacked by first generation larvae or by onion smut disease were frequently chosen for oviposition. These habits are important in view of the possible use of self-sown onions as a control during the spring months. The usual remedies are reviewed.

In the application of sodium arsenite poison bait, it was found that the sprinkling of the bait was not nearly so successful as bait pans used alone. Experiments in combining the use of cull or trap onions with the liquid poison bait method indicate that these will probably prove the most satisfactory method of dealing with *H. antiqua*.

HUDSON (H. F.) & WOOD (A. A.). **Notes on the Life History of the Clover Leaf Weevil** (*Hypera punctata*). —*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 45–47. Toronto, 1924.

Much of this information regarding *Hypera punctata* (clover leaf weevil) has previously been noticed [*R. A. E.*, A, ix, 312]. The seasonal history for western Ontario is described in detail, there being apparently only one generation, the adults spreading to new fields during late August. Hibernation occurred in any of the four larval stages as well as in the egg stage.

FELT (E. P.). **Winds and Gipsy-moth Spread.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 47–51. Toronto, 1924.

In view of the importance of wind as a factor in the spread of gipsy moth [*Porthetria dispar*, L.], and of the proposal to create a barrier zone in which the moth should not be allowed to establish itself, a study was made of the winds of western Massachusetts and eastern New York during the period when conditions were favourable for wind-spread. The figures for 1923 show a distinctly smaller probability of the pest being swept westward from the New York State boundary line than is the case in the Connecticut valley and particularly in eastern Massachusetts. Furthermore, it has taken over 20 years for the gipsy moth to spread from the vicinity of Boston, Mass., to the New York

State line, and if the wind is an important factor it must be concluded that the westward spread into New York State will be still slower. From an examination of the records of the United States Weather Bureau for New England and eastern New York Stations, it is evident that east winds are much less prevalent in western Massachusetts and eastern New York than on the eastern coast of New England, and consequently less likely to carry gipsy moth caterpillars westward. In view of the recently discovered infestation in north-western Vermont, a tabulation of the principal wind components from two localities in Vermont, likely to be of interest to Canada, is given, and, as a supplement to these records, a large number of hydrogen-inflated toy balloons were liberated in various districts of Vermont, Massachusetts, Connecticut and New York, the extent and direction of their drifting being shown in a table. It was noticed that practically all the drift was easterly, northerly or southerly, there being less than 2 per cent. in a westerly direction. There is therefore less probability of young larvae of *P. dispar* being carried westward by the prevailing winds than in any other direction ; indications are therefore favourable to the maintenance of a barrier zone.

McIntyre (H. L.). **Will the Gipsy-moth cross the International Boundary ?**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 51–55. Toronto, 1924.

If the gipsy moth [*Porthetria dispar*, L.] has not yet crossed the boundary into Canada, it is certain that it will become established unless immediate action is taken to determine whether or not it is present, and the necessary funds furnished for extermination wherever it is located. Statistics are given of the cost of the gipsy-moth suppression campaign in New England, which clearly indicate that the problem is worth the most serious consideration. Although climatic and other conditions might retard to some extent the increase of the insect in Canada, it is bound to become of enormous economic importance if it gains an entry into the country. The advisability of co-operation is pointed out, for if Canada makes no attempt to keep down infestation adjacent to the New York border, the attempt to establish a barrier zone in New York would be useless.

A discussion on the cost and results of extermination work in New Jersey followed the reading of this paper.

Ross (W. A.) & Caesar (L.). **Insects of the Season.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 57–63. Toronto, 1924.

Injurious insects recorded during the year in Ontario and not dealt with in the previous year's report [*R. A. E.*, A, xi, 499], nor in special papers in the present series, include *Halisidota tessellaris* (yellow tussock caterpillar), which was extremely abundant in south-western Ontario, the caterpillars attacking various trees and shrubs and defoliating apple orchards in several instances during September ; *Aphis pomi* (green apple aphis) and *Anuraphis roseus* (rosy apple aphis) ; *Psylla* (*Psyllia*) *pyricola* (pear psylla) ; the plant bugs, *Lygus caryae*, *L. quercalbae* and *L. omnivagus*, which damaged peaches growing near hickory and oak ; *Polychrosis viteana* (grape-berry moth), injurious locally ; *Contarinia johnsoni* (grape blossom midge) ; *Colaspis flava*, feeding on grape foliage ; *Tetranychus telarius* (red

spider) on raspberries, black currants and strawberries ; *Oecanthus nigricornis* (striped tree-cricket) on raspberries ; *Otiorrhynchus ovatus* (strawberry root weevil), which was apparently present in injurious numbers for the first time ; *Anasa tristis* on cucurbits ; *Euphoria inda* (bumble flower beetle), particularly abundant on sweet maize ; *Mamestra picta* (zebra caterpillar) on turnips, etc. ; *Datana integerrima* (walnut caterpillar) [*cf. R. A. E.*, A, xii, 497] ; *Anisota senatoria* (spiny oak caterpillar) ; a lilac leaf-miner, thought to be probably *Gracilaria syringella* ; *Papaipema purpurifascia* (columbine borer) ; and *Macronoctua onusta* (iris borer). Silver-fish (*Lepisma domestica* and *L. saccharina*) were very troublesome in bakers' shops, and the latter occasionally in private houses.

HUTCHINGS (C. B.). **A Study of the Pupal Case of** *Prionoxystus macmurtrei*.—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 63–67, 6 figs. Toronto, 1924.

Prionoxystus macmurtrei, Guér. (lesser carpenter worm) is very injurious to the red oak [*Quercus rubra*] in parts of eastern Canada [*cf. R. A. E.*, A, xii, 497]. The principal characters of the external morphology of the pupal case are described, and a generic key to the pupae of Cossids occurring in North America is given.

MAHEUX (G.). **Insects of the Season in Quebec in 1923.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 71–73. Toronto, 1924.

Besides the more usual insects recorded from Quebec a number of others are noteworthy. *Rhagoletis pomonella* had spread considerably, and was very injurious to apples ; it is suggested that a change in spraying operations should be tried against it. *Coleophora malivorella* (pistol case-bearer) and *C. fletcherella* (cigar case-bearer) completely defoliated apples in some localities, but were kept in check where thorough spraying was done. *Tortrix* (*Cacoecia*) *argyrospila* (fruit-tree leaf-roller) was widespread and increasing ; and *Saperda candida* (apple borer) was also more numerous than usual and necessitated the cutting down of one orchard. On shade trees, *Malacosoma americana* and *M. disstria* (tent caterpillars) caused important outbreaks. *Coptocycla bicolor* and *C. signifera* (tortoise beetles) damaged convolvulus, eating holes in the leaves. *Lachnosterna* sp. is becoming a serious menace in old pasture lands.

KEENAN (W. N.). **The Spread and Degree of Infestation of the European Corn Borer in Ontario in 1923.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 74–78. Toronto, 1924.

A review is given of the situation in regard to the European corn borer [*Pyrausta nubilalis*, Hb.] in Ontario in 1923 [*R. A. E.*, A, xii, 248].

CRAWFORD (H. G.). **The Status of the Control Practice for the European Corn Borer in Ontario.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 78–82. Toronto, 1924.

This is a progress report, tracing the control measures that have been practised against the European corn borer [*Pyrausta nubilalis*, Hb.] in Ontario during the last few years. The reduction in numbers resulting from these measures is considered very promising.

Twinn (C. R.). **Studies in the Life-history, Bionomics, and Control of the Cabbage Worm in Ontario.**—*54th Ann. Rept. Ent. Soc. Ontario 1923*, pp. 82–86. Toronto, 1924.

In spite of artificial and natural control factors, *Pieris rapae*, L. (white or imported cabbage butterfly) still does considerable damage to cruciferous crops in Ontario, where the adults are on the wing from late May until the end of September. There are three well-defined generations, the adults appearing in maximum numbers in mid-June, in mid-July and from mid-August to the end of September. It seems certain that no adults emerge from the third generation pupae until the following spring.

The preferred food-plants are cabbage, cauliflower, radish, horse-radish, and several cruciferous weeds. The life-history is described. Dusting experiments prove that lead arsenate dust gives the best results, calcium arsenate in liquid form being very unsatisfactory as well as scorching the foliage. Pyrethrum powder used with 4 times its weight of hydrated lime proved satisfactory, but is very expensive. Early cabbages generally escape serious injury, and for late cabbages and cauliflowers two applications, the first in mid-July and the second 4 or 5 weeks later, should be sufficient ; if the insects are very abundant, a third application might be made early in September.

The numbers of *P. rapae* fluctuate greatly from year to year owing to natural control factors, of which the most important are flacherie and the two parasites, *Apanteles glomeratus*, L., and *Pteromalus puparum*, L. The Ichneumonid, *Itoplectis conquisitor*, Say, was recorded on 1st September from a pupa of *P. rapae* at Ottawa ; and wasps, including *Polistes pallipes*, Lep., and *Vespa germanica*, F., destroy the larvae.

Caesar (L.). **The European Corn Borer and the latest Methods of Control.**—*Ontario Dept. Agric.*, Circ. 44, 8 pp., 7 figs. Agric. Coll., Guelph, October 1924.

This is a popular account of the European corn borer [*Pyrausta nubilalis*, Hb.] and of the usual methods adopted for its control. Special suggestions with regard to ploughing the crop are given.

Ross (W. A.). **Three Important Insect Pests of 1923.**—*55th Ann. Rept. Fruit Growers' Assoc. Ontario 1923*, pp. 11–15. Toronto, 1924.

This is a popular discussion on the bionomics and control of the green apple aphis [*Aphis pomi*], the grape leafhopper [*Erythroneura comes*] and the pear psylla [*Psylla pyricola*], under Ontario conditions.

Caesar (L.). **The Spraying Calendar.**—*55th Ann. Rept. Fruit Growers' Assoc. Ontario 1923*, pp. 37–40. Toronto, 1924.

The importance of thoroughness in spraying is emphasised, and a spray calendar suitable for Ontario is discussed, many hints being given as to its use.

KELSALL (A.). **Dusts and Dusting in Crop Pest Control.**—*Scientif. Agric.*, v, no. 2, pp. 37–51. Ottawa, Ont., October 1924.

As a result of previous experiments, the author considered that dusting was as efficient as spraying for the control of biting insects, but was inferior for the control of sucking insects. Further experiment, however, has shown that these insects also can be controlled in the orchard very successfully by the dusting method, which has given better results than liquid sprays both in the orchard and on potatoes. The advantages of both methods are discussed, and it is agreed that, in general, spraying is the better method where pests are present in unusual numbers and for use against Coccids, while dusting gives greater speed in application, is cheaper, requires lighter machinery, and can be used where water is not available. The values of different dusting materials are compared, and the adhesive qualities of dusts, methods of mixing, suitable machinery and application are discussed. With regard to the future of dusting certain probable developments are suggested. Dusting machinery, for example, may be used to project other materials, such as noxious vapours and gases of nicotine, tetrachlorethane, and hydrocyanic acid. A method has recently been developed of applying liquid materials by means of pressure obtained by the aid of a pump on the liquid itself. A dusting machine can be used to project liquid on to the plant by means of the air blast. By elaborating this method it is possible that spraying may be done with something like the same speed as dusting. This may prove a very valuable addition to both spraying and dusting methods. For example, Bordeaux mixture might be applied by projecting a fine mist of a fairly concentrated copper sulphate solution and at the same time dusting with hydrated lime, or nicotine solution might be similarly applied with the regular dusts.

DAVIS (J. J.). **Principles of Insect Control.**—*Canad. Ent.*, lvi, no. 9, pp. 203–206. Orillia, Ont., September 1924.

The author emphasises the importance of farm practices in relation to insect pests, and indicates the methods of analysing the various factors concerned in control that have been followed for the past two years at Purdue University. These factors are considered under the headings of natural control, including the effects of various climatic conditions and of the action of natural enemies ; and artificial control, including farm practices of all kinds, and the usual mechanical methods such as the use of screens, traps or insecticides.

The Control of the Cotton Weevil.—*Science*, lx, no. 1554, Suppmt., p. xii. Garrison, N.Y., 10th October 1924.

Attempts are being made to discover which of the many complex substances in the cotton plant gives it its peculiar attraction for the cotton weevil [*Anthonomus grandis*]. When this is known and the substance produced in sufficient quantities to be used as a bait for traps or mixed with poison, an important advance will have been made in controlling this pest.

Haley (D. E.), Gardner (F. D.) & Whitney (R. T.). *Nicotiana rustica* **as a Source of Nicotine for Insect Control.**—*Science*, lx, no. 1555, pp. 365–366. Garrison, N.Y., 17th October 1924.

In experiments with various types of tobacco with a high nicotine content for insecticidal purposes, *Nicotiana rustica* alone gave satisfactory results. Plants that had been topped or had had the suckers removed during growth gave a very much higher percentage of nicotine. While nicotine can readily be extracted from tobacco wastes by steeping the material in cold water, it can be obtained even more readily by treating the tobacco with cold water, bringing it to the boil and immediately filtering through cheesecloth, a very few washings with hot water freeing the residue of nicotine. Solutions of nicotine thus obtained of 0·06 to 0·2 per cent. strength, mixed with a little soap, possess aphicidal properties comparable with those of nicotine solutions of the same concentration made by diluting a standard 40 per cent. nicotine solution.

Quarantine Circular. No. 2. Laws of Mississippi and Rules and Regulations.—*State Plant Bd. Mississippi*, 14 pp. Agric. Coll., Miss., 15th January, 1921. [Received 16th October 1924.]

The sections of the Mississippi Plant Act of 1918 relating to the introduction of nursery stock into the State and its transportation within it are here reprinted, with the rules and regulations adopted by the State Plant Board in accordance with it.

Supplement A to Quarantine Circular No. 2.—*State Plant Bd. Mississippi*, 2 pp. Agric. Coll., Miss., August 1921. [Received 16th October 1924.]

To prevent the introduction into Mississippi of the alfalfa leaf weevil, *Hypera variabilis* (*Phytonomus posticus*), the shipment of alfalfa and all other hay from all States other than Colorado, Idaho, Nevada, Oregon, Utah and Wyoming and from any other States that may be found infested with the weevil is prohibited, unless accompanied by a permit.

Supplement B to Quarantine Circular No. 2.—*State Plant Bd. Mississippi*, 4 pp. Agric. Coll., Miss., August 1922. [Received 16th October 1924.]

Details are given of quarantine measures to prevent the further distribution of the sweet potato weevil, *Cylas formicarius*, F., in Mississippi and the introduction into the State of the pink bollworm, *Platyedra gossypiella*, Saund.

Compere (H.). **A preliminary Report on the Parasitic Enemies of the Citricola Scale** [*Coccus pseudomagnoliarum* **(Kuwana)] with Descriptions of two new Chalcidoid Parasites.**—*Bull. S. California Acad. Sci.* xxiii, no. 4, pp. 111–123, 6 figs. Los Angeles, Cal., 12th September 1924.

In California, the citricola scale, *Coccus pseudomagnoliarum*, Kuwana [*R. A. E.*, A, xi, 336], is infested by at least four primary parasites, which are, in order of their importance, *Aphycus luteolus*, Timb. (first recorded as *Aphycus* sp. near *flavus*, How. [*R. A. E.*, A, i, 309]),

Coccophagus lecanii, Fitch, *C. lunulatus*, How., and *Microterys flavus*, How. These parasites also attack *Coccus hesperidum*, L. The latter scale is held in check almost entirely by them, their lack of effectiveness in the case of the citricola scale being due, in the author's opinion, to the fact that, unlike *C. hesperidum*, it has but one generation a year, so that hosts of a size suitable for the parasites are not always available. A fifth species, *Aphycus alberti*, How. (first recorded [*loc. cit.*] as *Aphycus* sp. near *coquilletti*, How., and said to be rare) has been reared in considerable numbers from *C. hesperidum* in Pasadena, California, and probably also parasitises the citricola scale.

From shipments to California from Yokohama of parasitised scale material, four primary parasites have been reared, viz. :—*Coccophagus yoshidae*, Nakayama, from *Coccus hesperidum*, *Anicetus annulatus*, Timb., from both scales, and two new species, *Aphycus orientalis* from both scales, and *Coccophagus japonicus* from *C. pseudomagnoliarum*.

TRIMBLE (F. M.). **The Azalea Leaf Miner (Lepid. : Tineidae).**—*Ent. News*, xxxv, no. 8, pp. 275–279, 1 pl. Philadelphia, Pa., October 1924.

Gracilaria azaleella, Brants (*azaleae*, Busck), which is specifically distinct from *G. zachrysa*, Meyr., is a native of Japan and was imported into North America from Belgium and Holland, where it had been received from Japan on young plants. It occurs on various ornamental azaleas, causing serious injury to those forced in greenhouses. No attack on other plants has so far been noted. A description is given of the various stages of the moth. The characteristic injury appears soon after the plants are placed in the greenhouse for forcing. The leaves are mined and skeletonised by the larvae and drop, making the shrub unfit for sale. Varying weather conditions are the chief agents that control this pest in the open, though larvae of *Chrysopa* sp. have been noticed attacking the larvae. In the greenhouse only one Chalcid, a species of *Sympiesis*, closely allied to *S. massasoit*, Crawf., has been found to attack this leaf-miner. It may be controlled in greenhouses by cyanide fumigation, previous to forcing, followed in the forcing house by fumigations with nicotine sulphate on alternate nights to kill the newly hatched larvae.

CARSNER (E.) & STAHL (C. F.). U.S. Bur. Ent. **Studies of Curly-top Disease of the Sugar Beet.**—*Jl. Agric. Res.*, xxviii, no. 4, pp. 297–320, 5 pls., 1 fig. Washington, D.C., 26th April 1924. [Received 15th October 1924.]

Curly-top is the cause of greater losses than any other sugar-beet disease in the United States. Great damage is caused when the beets are grown as an annual crop and for seed production. It is only known to occur in the semi-arid regions of the western part of North America. The information concerning it is reviewed at length, including tests in regard to the relation of light, heat, etc. The virus probably overwinters in susceptible wild annuals, self-sown beets, and in the insect transmitter, *Eutettix tenella*, Baker. No satisfactory control of this leafhopper by artificial or biological means has been discovered, but much injury may be avoided by early planting. There is reason to believe that a resistant strain of beets may be evolved.

Larson (A. O.). U.S. Bur. Ent. **Fumigation of the Bean Weevils, *Bruchus obtectus* Say and *B. quadrimaculatus* Fab.**—*Jl. Agric. Res.*, xxviii, no. 4, pp. 347–356. Washington, D.C., 26th April 1924. [Received 15th October 1924.]

Fumigation of beans in warehouses or under canvas covers and in loaded freight cars is not always satisfactory, and these investigations were undertaken to determine which stage of the Bruchids, *Bruchus obtectus*, Say, and *B. quadrimaculatus*, F., is least or most resistant to fumigation. Carbon bisulphide was used in quantities varying from 1·5 to 31 lb. per 1,000 cu. ft., at temperatures of from 52° to 82° F., and with exposures of from 1 to 90 hours, as well as in a vacuum of 29 inches. Liquefied hydrocyanic acid was used in amounts of from 1·3 to 3·5 lb. per 1,000 cu. ft., at temperatures of from 58° to 92°F., and with exposures of from 24 to 90 hours. For generating hydrocyanic acid gas by the pot method, from 1·8 to 3·4 lb. of sodium cyanide was used per 1,000 cu. ft., at 67° to 84°F., for from 48 to 90 hours. Hydrocyanic acid gas is not considered to be any more dangerous for commercial use than carbon bisulphide, provided that the same amount of care is taken. It is possible by using a good grade of either substance in a gas-tight fumigator, at a sufficiently high temperature and with a sufficiently long exposure, to kill all the Bruchids in all stages, either within or among beans or cowpeas with one fumigation. For small quantities of beans 3 lb. of carbon bisulphide per 1,000 cu. ft. at a temperature of 58°F. or higher, for a period of 24 hours, or half the quantity for 48 hours, is the minimum amount for thorough fumigation. The amount for liquefied hydrocyanic acid is 2 lb. for 48 hours at 70°F. or higher, or 1·3 lb. for 90 hours. Similar results are obtained with hydrocyanic acid gas generated from 3·4 lb. of sodium cyanide by the pot method at 70°F. for 48 hours, or from 1·8 lb. of sodium cyanide for 90 hours. With large quantities it is preferable to increase the amount of fumigant rather than the time of exposure.

In the case of *B. obtectus* the unemerged adults and pupae are most resistant; the ability to withstand fumigation however depends greatly on the depth at which the insect is buried in the bean. The order of susceptibility of the other stages is emerged adults, eggs, and young larvae. The various stages of *B. quadrimaculatus* are most easily killed in the following order: emerged adults, eggs, larvae that have not entirely left the chorion, and young larvae just inside the seed; the other stages appear to be affected almost equally, though the prepupae appear to be slightly more resistant, presumably for the same reason that the larvae that are deepest in the cowpeas survive longer than the others.

Brooks (F. E.). U.S. Bur. Ent. **The Cambium Curculio, *Conotrachelus anaglypticus* Say.**—*Jl. Agric. Res.*, xxviii, no. 4, pp. 377–386, 3 pls. Washington, D.C., 26th April 1924.

Cotton (R. T.). U.S. Bur. Ent. **Description of Larva and Pupa.**—pp. 380–384, 2 figs. [Received 15th October 1924.]

Conotrachelus anaglypticus, Say (cambium curculio) is common from Massachusetts to Florida, its range extending as far west as Iowa, Kansas and Texas. From observations made in Virginia, where it is

abundant, the normal place for oviposition and larval development appears to be round the borders of fresh wounds in the bark of many kinds of orchard and forest trees. A list is given of the trees on which it has been found. Both larvae and adults are also found in large numbers in stumps and ends of logs cut in the forest for lumbering purposes, feeding about wounds in apple bark made by falling hailstones, and feeding in apple bark at the edge of wounds made in pruning, and in other similar places. During June and July as many as 24 and 38 larvae have been taken from the edge of one wound. Very little preference is shown for any particular tree, though apple and pear seem to be especially attractive. Weevils, however, were attracted to every trapping place made in June, regardless of the species of tree used, and later the larvae were always present. Besides enlarging and preventing the healing of wounds in the bark of various kinds of trees, injury to the fruit of peaches and to cotton bolls has also been recorded, but it is possible that sound ones are not usually attacked. In feeding in the bark, the larvae mine inward through the cambium from the edge of fresh wounds. The feeding area is usually in the form of a band around the wound varying from half an inch to two inches in width. The cambium is destroyed and the wound enlarged to this extent; as it grows old, however, the larvae cease their attack.

The eggs hatch in 2 to 4 days, a single weevil laying from 25 to 30 eggs on the average. The larvae usually feed from 2 to 4 weeks and then enter the ground for pupation. The weevils issue from the soil in late summer and autumn, and hibernate very soon afterwards, possibly in litter on the ground. There are two generations in Georgia, but from West Virginia northward, there appears to be only one generation annually. Two parasites probably attack *C. anaglypticus*, the Ichneumonid, *Thersilochus conotracheli*, Riley, in West Virginia and the Tachinid, *Myiophasia globosa*, Towns., reared from cotton bolls infested with the weevil in Louisiana.

On peaches this weevil can no doubt be controlled by the same methods as adopted against *C. nenuphar*, Hrbst., such as jarring, spraying, etc., as the habits of the two species are so similar. To prevent the enlargement of wounds on fruit and other valuable trees their edges should be made smooth and a heavy coat of white-lead paint or some reliable tree paint applied to all the injured parts. The paint will prevent oviposition around the wounds.

Moore (W.) & Campbell (F. L.). U.S. Bur. Ent. **Studies on Non-arsenical Stomach-poison Insecticides.**—*Jl. Agric. Res.*, xxviii, no. 4, pp. 395–402. Washington, D.C., 26th April 1924. [Received 15th October 1924.]

Details are given of tests made with various non-arsenical insecticides for the control of the Japanese beetle [*Popillia japonica*, Newm.]. None of them proved of much value. Copper cyanide was the only material tested that was comparable to lead arsenate in toxicity, while copper thiocyanate though highly toxic to *Malacosoma americana*, F., was not toxic to *P. japonica*. No definite relations were found between chemical constitution and toxicity.

GODFREY (G. H.). **Dissemination of the Stem and Bulb infesting Nematode, *Tylenchus dipsaci*, in the Seeds of certain Composites.**— *Jl. Agric. Res.*, xxviii, no. 5, pp. 473–478, 3 pls. Washington, D.C., 3rd May 1924. [Received 15th October 1924.]

The literature on this subject is reviewed, and the following is the author's summary of the paper:—The leaf and stem infesting Nematode, *Tylenchus dipsaci*, Kühn, has been found to be abundant on the false dandelion, *Hypochaeris radicata*, along the Pacific coast, from Tacoma, Wash., to San Francisco, Cal. It occurs as well on the true dandelion, *Taraxacum officinale*, in Western New York, the Province of Ontario, Canada, and at Boston, Mass. According to the literature, it occurs abundantly on these and other composites in Europe.

In addition to producing swellings and distortions of the leaves, the Nematodes penetrate the developing flower-head and produce more or less distortion in that region. Furthermore, in the case of the false and true dandelion, they were observed to have actually penetrated into the interior of the seed. This accounts definitely for their wide distribution on these hosts, for the wind carries the Nematode-infested equally well with the Nematode-free seed.

Directions for Spraying Fruits in Illinois.— *Illinois Agric. Expt. Sta.*, Circ. 277, 24 pp., 3 figs. Urbana, Ill., February 1924. [Received 16th October 1924.]

This is an extensive revision of a previous circular [*R. A. E.*, A, xi, 535].

[**Insect Pests in 1923-24.**]—*Pennsylvania Agric. Expt. Sta.*, Bull. 188, pp. 16–17. State Coll., Pa., August 1924.

A study of home-made oil emulsions and commercial preparations shows that the former compare very favourably with the latter. For dormant and delayed dormant sprays, 3 U.S. gals. red engine oil, $1\frac{1}{2}$ lb. calcium caseinate (kayso) and a little water were mixed to make a stock solution, which was diluted with 300 U.S. gals. water when required for use. The stock solution remained emulsified even after standing for several weeks.

Against the apple red bug [*Heterocordylus malinus*] nicotine dust proved as satisfactory for use on the petals as nicotine spray. Two per cent. nicotine sulphate with dolomite or hydrated lime as a carrier was used with success. Tests with mercury bichloride 1 : 1,000 have been continued against the cabbage root maggot [*Phorbia brassicae*] with satisfactory results. Information has already been noticed regarding Aphids on vegetable crops [*R. A. E.*, A, xii, 328] and millipedes in cold frames [*R. A. E.*, A, x, 44].

MORGAN (A. C.) & GILMORE (J. U.). U.S. Bur. Ent. **The Tobacco Flea-beetle in the dark fire-cured Tobacco District of Kentucky and Tennessee.**— *U.S. Dept. Agric.*, Farmers' Bull. 1425, 11 pp., 11 figs. Washington, D.C., July 1924.

Epitrix parvula, F. (tobacco flea-beetle), which has been dealt with at length as occurring in the southern district (north Florida and south Georgia) where the cigar-wrapper type of tobacco is grown [*R. A. E.*, A, xi, 570], is here reported upon in Kentucky and Tennessee, where

the dark, fire-cured tobacco is grown. There are three generations, the adults of the first appearing about 1st July, those of the second in August, and those of the third probably late in September, though the second and third often overlap so as to be practically indistinguishable. Next to tobacco, the preferred food is *Physalis virginiana* (ground cherry); other plants are also attacked, such as egg-plant, tomato, and various solanaceous weeds, the names of which are given, while leaves of trees, cowpeas, and a variety of weeds may be utilised for food under adverse conditions. Tobacco in the plant beds is chiefly injured in April, and in cool weather feeding may be continuous throughout the month, and the whole bed may be destroyed and require re-sowing. In this case a late crop is produced, which is always more subject to insect injury than an earlier one. When infestation is slight, the injury is generally confined to the margins of the beds and to areas beneath holes in the cheesecloth covers. The injured plants are always stunted and very seldom worth planting out. After the tobacco has been set in the field, the adults attack the leaves and the larvae feed on the tender rootlets. The greatest damage is done when the tobacco is about half grown and during the later stages.

The authors' summary of remedial measures is as follows: Locate the plant beds as far as practicable from the flea-beetle hibernating quarters. Sow the seed early, bank the earth about the boundary poles, and use sound cheesecloth properly applied. Poison the bed if flea-beetles appear, using the one-in-six mixture (1 lb. Paris green, with 5 lb. lead arsenate) at the rate of ½ lb. per 100 sq. yards. Before pulling the plants, dust at the rate of 1 lb. of the mixture to 100 sq. yards of plant bed. If a liquid spray is preferred, use from 1½ to 2 lb. of the mixture in 50 U.S. gals. of water. For newly set plants use about 3 lb. per acre of the one-in-six mixture in all methods of application, except the stick-can [a tin fastened to a stick and having nail holes in the bottom through which the dust is sifted on to the individual plants]. With the stick-can the formula should be 1 lb. of Paris green in from 20 to 40 lb. of flour, about 5 lb. of this mixture being applied per acre. For field control on tobacco, half grown or larger, use from 4 to 6 lb. per acre of the one-in-six mixture. This will control hornworms [*Protoparce*] as well.

The various types of hand and machine dusters are discussed.

HARNED (R. W.). **Annual Report of the Entomology Department.**—*36th Ann. Rept. Mississippi Agric. Expt. Sta. 1922–23*, pp. 18–27. Agric. Coll., Miss., 1923. [Received 27th October 1924.]

A list of 50 Coccids collected during the year under review is given, together with the food-plants, locality and date of capture. These include the following new records for Mississippi: *Aspidiotus osborni* on oak; *Chrysomphalus dictyospermi* var. *arecae* on *Citrus*; *C. pinnulifera* on jasmine; *Toumeyella* (*Lecanium*) *numismatica* on pine; and *Eucalymnatus* (*L.*) *perforatus* on palm.

For the first time since 1917 complaints have been received about injury to pecans by Scolytids.

WOODARD (J. S.). **Pecan Insects.**—*Texas Dept. Agric.*, Bull. 77, pp. 125–142, 12 figs. Austin, Texas, June–July 1924.

This is a revision of a previous bulletin [*R. A. E.*, A, xi, 267]. The insects dealt with are substantially the same.

Perry (W. M.). **Insect Control.**—*Rept. Virgin Islands Agric. Expt. Sta. 1923*, p. 13. Washington, D.C., 1924.

Owing to a prolonged period of drought, insect pests were more numerous than usual, the larvae of *Pieris* (*Pontia*) *monuste* (southern cabbage butterfly) and of *Plutella maculipennis* (diamond-back moth) causing serious injury to mustard, turnips, cabbage, kohl-rabi and radishes. The former was successfully controlled by the application of a dust of 1½ parts of a commercial preparation of arsenic (containing 30 per cent. of arsenic oxide), 1½ parts lime and 7 parts finely ground sulphur. This could not be applied against *P. maculipennis* as the larvae appeared in large numbers just as the crops were ready for harvesting. Beans and okra [*Hibiscus esculentus*] were seriously injured by *Diaprepes abbreviatus* (West Indian sugar-cane root borer). *Zinckenia fascialis* (Hawaiian beet webworm), which attacked beets, carrots and Swiss chard, was controlled by the application of lead arsenate and air-slaked lime in equal parts. *Diaspis* (*Aulacaspis*) *pentagona* (white peach scale) heavily infested papaw trees, which were cleansed by the use of fish-oil soap at the rate of 1 lb. to 5 U.S. gals. water.

Barreto (B. T.). **Enfermedades y Enemigos de las Abejas en Cuba.** [Diseases and Natural Enemies of Bees in Cuba.]—*Agricultura*, i, no. 12, pp. 4–7, 2 figs. Santiago de las Vegas, September 1924.

The two insect pests briefly discussed are the moths, *Galleria mellonella* and *Achroia grisella* ; no new information is given.

Bruner (S. C.). **La Enfermedad del Mosaico de la Caña de Azúcar.** [The Mosaic Disease of Sugar-cane.]—*Cuba Estación Expt. Agron.*, Circ. 60, 16 pp., 5 pls. Santiago de las Vegas, December 1923. [Received 20th October 1924.]

This circular reviews existing knowledge on sugar-cane mosaic and its transmission, the chief vector being *Aphis maidis*. Full references to the literature from Cuba and elsewhere are given.

Wolcott (G. N.). **Hormigas.** [Ants.]—*Puerto Rico Estación Expt. Insular*, Circ. 75, 11 pp. Rio Piedras, P.R., 1924.

Forty-five species of ants are known from Porto Rico. Many are household pests, and against them the poison recommended by Barber [*R. A. E.*, A, viii, 285] should be used. *Solenopsis geminata*, F., is the chief protector of various Coccids, and when thus fostered, *Pseudococcus citri*, Risso, the principal pest of pineapple in Porto Rico, may become very abundant. Both the ant and the mealy-bug may be checked by a spray of 2 gals. kerosene, 1 pint crude carbolic acid, ½ lb. soap and 1 gal. water. *Myrmelachista ambigua ramulorum*, Wheeler, infests shade-trees in coffee plantations, and when abundant it migrates to the coffee bushes, some planters considering it to be the chief pest of coffee. A bait of meat poisoned with sodium or potassium cyanide effectively reduces the numbers of this ant. *Wasmannia*

auropunctata, Roger, also tends scale-insects and mealy-bugs, but not to a dangerous extent. It is supposed to drive away *M. ambigua ramulorum*, and up to the present it is not known whether this species is more harmful than beneficial.

WITHYCOMBE (C. L.). **Notes on Cotton Stainer Control.**—*Trop. Agriculture*, i, no. 10, pp. 156–157. Trinidad, October 1924.

A preliminary outline of the general results of a study of cotton-stainers (*Dysdercus* spp.) in Trinidad is given. The destruction of all wild Malvaceous plants that serve for food and a close season for cotton are obvious remedial measures that have already met with a fair degree of success where they are practicable. In Trinidad, where *D. howardi* has been the chief species under observation, the stainers generally appear on cotton when the bolls are ripening and not before. A newly planted cotton field, if sufficiently separated from sources of infestation, will remain uninfested until the ripe bolls begin to open. As soon as this occurs, stainers migrate in numbers to the field and breed on the cotton until conditions are no longer favourable. It is known that the stainers migrate in response to a definite attraction exerted by the opening bolls, some odoriferous substance being given off from inside the boll, which is most effective when the boll first opens. Attempts to isolate this attractive substance have met with some degree of success, but it has not been possible as yet to determine its exact nature. Opening bolls of okra [*Hibiscus esculentus*] are also highly attractive. Examination of the migrants to cotton show that they consist largely of small or dark-coloured or otherwise non-typical forms. Their production does not seem to be subject to the ordinary Mendelian laws, and all breeding experiments point to their being produced by environmental conditions. No unusual migratory forms have been obtained experimentally by breeding stainers on cotton bolls under presumably good conditions, but the migratory forms have been obtained by breeding from typical, pale, large individuals of *D. howardi* under what were calculated to be unfavourable conditions. Peculiar varietal forms that seem also likely to be correlated with environment have been noted in other parts of the world; *D. discolor* (*delauneyi*) in St. Vincent has a light-coloured form that may be of this nature. Several Nigerian species, *D. melanoderes*, *D. nigrofasciatus* and *D. intermedius*, are thought by the author to be merely forms of *D. superstitiosus*. Similar varietal forms in locusts have been found to be associated with migration [*R. A. E.*, A, ix, 561].

It is obvious from these observations that the first pickings of cotton bolls will yield a fair proportion of good and unstained lint, but that subsequent pickings of bolls that have developed under infestation will be of progressively less value. At the St. Vincent Experiment Station all plants are actually destroyed after the first picking, and, probably in consequence, show better crops and greater freedom from stainers than those in other parts of the island. If this practice is adopted, a different crop must be grown on the ground following the cotton so that no further breeding of stainers can occur. Each new cotton field should be situated at some distance from any source of infestation; the indications are that a distance of 200 yards is sufficient for this purpose, but this requires to be verified by actual experiment.

Winters (N. E.). **Breve Manual para el Cultivo del Algodonero en la República Argentina.** [A Short Manual on Cotton Cultivation in Argentina.]—*Minist. Agric. de la Nación*, Circ. 320, 24 pp. Buenos Aires, 24th September 1924.

The title of this circular describes its contents. The section on cotton seed contains instructions for fumigating seed with carbon bisulphide against the pink bollworm [*Platyedra gossypiella*], while this as well as *Heliothis obsoleta* and *Alabama argillacea* are the subject of notes in the chapter on pests.

Lahille (F.). **Sobre una nueva especie de cochinilla,** *Alichtensia orientalis* **Lah.** [On a new Species of Scale-insect, *A. orientalis*.]—*Uruguay: Minist. Indust., Defensa Agric., Bol. Mens.*, v, no. 7–8, pp. 105–108, 10 figs. Montevideo, July–August 1924.

Alichtensia orientalis, sp. n., is described from Uruguay, from the shoots of *Baccharis refracta*.

Trujillo Peluffo (A.). *Chionaspis citri* **Comst., cochinilla de los citros.**—*Uruguay: Minist. Indust., Defensa Agric., Bol. Mens.*, v, no. 7–8, pp. 109–112, 3 figs. Montevideo, July–August 1924.

Chionaspis citri, Comst., one of many Coccids introduced into Uruguay with imported plants, was only noticed about 3 or 4 years ago, but has since spread rapidly in the citrus-growing districts. A description is given of this pest. There seem to be 2 or 3 generations a year, the first appearing at the end of September or early in October. Spraying with kerosene emulsion or lime-sulphur is advised, 3 or 4 applications being made at intervals of 15 to 20 days.

La langosta en el Uruguay. [Locusts in Uruguay.]—*Uruguay: Minist. Indust., Defensa Agric., Bol. Mens.*, v, no. 7–8, pp. 121–122, 1 map. Montevideo, July-August 1924.

Uruguay is invaded almost every year by locusts, *Schistocerca paranensis*, from the waste lands of Argentina, Paraguay, Bolivia, etc. In 1924 the swarms appeared in July, probably earlier than for the past 20 years.

Ghosh (C. C.). **Reports by the Entomologist, Mandalay, for Years ended 30th June 1922 and 1923.**—pp. 1–14 & 1–19. Rangoon, 1923 & 1924. [Received 13th October 1924.]

Notes are given on all the pests recorded during the two years under review, many of which have already been dealt with by the author elsewhere [*R. A. E.*, A, xii, 381–383].

Those not previously mentioned include *Ripersia sacchari* (yellow mealy-bug) and *Aleurodes* sp., which suck the juice from the stem and leaves of sugar-cane; *Stenachroia elongella* and *Aphanus sordidus*, occurring on millet heads; *Heliothis obsoleta*, on gram; *Nezara viridula* and *Diacrisia obliqua*, on *Glycine hispida*, the latter also on sunflower and beans; *Maruca testulalis*, boring in bean pods; the crickets, *Brachytrypes portentosus* and *Liogryllus bimaculatus*, on beans; *Stauropus alternus* and *Bruchus theobromae*, on pigeon pea

(*Cajanus indicus*) ; *Antigastra catalaunalis*, which rolls the top leaves and also bores in the pods of *Sesamum* ; *Achaea janata* (*melicerta*) (castor semilooper), *Prodenia litura* and *Ergolis merione* (castor butterfly), on castor ; *Perigea capensis*, on safflower ; and *Maruca testulalis* and *Xylotrupes gideon*, infesting ground-nuts.

On cotton were recorded *Earias fabia*, *E. insulana*, *Platyedra gossypiella*, *Sylepta derogata*, *Dysdercus cingulatus*, *Oxycarenus laetus*, *Cerococcus hibisci* (only of importance on old crops), Jassids, *Aleurodes*, *Acrocercops* and *Zonabris*. The vegetable pests were *Hellula undalis*, on radish, *Athalia proxima* (mustard sawfly), *Bagrada picta*, on cabbage and cauliflower, and *Dorylus* sp., on turnip, carrots, etc. Fruit pests were *Cryptorrhynchus mangiferae* (seed-boring weevil), on mango ; *Glyphodes caesalis*, boring in young fruits of jak [*Artocarpus integrifolia*] ; *Odoiporus longicollis* (stem-boring weevil), on plantain ; *Eriophyes* sp., on litchi ; *Balaninus* sp., on wild apple (*Pyrus vestita*) ; *Chrysocoris grandis*, *Rhynchocoris humeralis* and *Phyllocnistis citrella*, on *Citrus* ; and *Glyphodes pyloalis*, on mulberry. *Agrotis ypsilon*, *Brachytrypes portentosus* and *Heliothis assulta* occurred on tobacco, and *Zeuzera coffeae* on tea. *Bruchus chinensis*, *B. theobromae*, *Calandra oryzae* and *Sitotroga cerealella* infested stored grain.

The chief insect enemies of bees are *Galleria mellonella* (wax moth), *Achroia grisella* (lesser wax moth), and the wasp, *Vespa auraria*, which catches the bees while on the wing.

KUNHI KANNAN (K.). **Lantana Flies** (*Agromyza lantanae*, **Frogg.**) **in Hawaii.**—*Agric. Jl. India*, xix, pt. 5, pp. 504–508. Calcutta, September 1924.

A study of *Agromyza lantanae*, Frogg., in Hawaii shows that the check that *Lantana* has received is in a great measure due to the conjoint action of many insects and other factors, rather than to the activities of this particular one. It has also been shown that there is very little likelihood of its attacking the seeds of teak, which was the chief objection to its introduction into India. It has now been introduced into India, but has not yet become established. As the direct shipping service from Hawaii to India has been suspended, it is suggested that further consignments should be obtained from Queensland.

BEESON (C. F. C.). **The Economic Importance and Control of the Sal Heartwood Borer** (*Hoplocerambyx spinicornis*).—*Indian Forester*, l, no. 10, pp. 516–524. Allahabad, October 1924.

In 1916 an outbreak of *Hoplocerambyx spinicornis*, Newm. (large sal-borer) was discovered in the Dehra-Dun Division, extending over nearly 8 square miles of country with 4,883 acres of forest. It is now known that the outbreak had been working up for several years and that the predisposing factors were climatic, particularly rainfall above the normal. The beetles attacked the living trees of sal [*Shorea robusta*] during the rains, from July to September, and their larvae bored in the sapwood during the remaining months of the year, girdling and killing the trees. Trees of all sizes and ages were attacked. The outbreak continued unchecked for four years, the timber damaged

amounting to nearly a million cu. ft., representing a loss of Rs. 2,68,562, at a depreciation of about 4 annas per cu. ft. standing. The remedial measures originally suggested by the Forest Research Institute were not adopted until 1920, but from 1921 onwards a real decrease in the abundance of the beetle and the amount of the loss was effected. During the four years under control measures, an average annual reduction of loss of 85 per cent. was obtained. The incidence of attack on the growing stock had been reduced to less than 1 per cent. in 1923, and there is therefore no question that the outbreak has been successfully dealt with and all but stamped out. These results are assigned directly to the remedial measures, this theory being upheld by a review of the various probable phases of an unchecked outbreak. The rainfall in 1921–23 was above the normal, making these years favourable for the maintenance of a high and probably increasing borer incidence. It is concluded that the insect was on the increase from 1920 onwards, and the general incidence of attack in the previously lightly attacked areas was rising to the level of one tree on two acres, in spite of the fact that remedial measures were reducing the total attack in the heaviest centres. The loss prevented by the control operations is estimated at a sum between one and three lakhs of rupees, this being a net profit, as the operations were carried out by timber purchasers, the usual enumeration costs being the only ones incurred by the local Government. To this sum should be added the revenue realised by the sale of the attacked timber.

Similar operations on a smaller scale were carried out in another forest of the same division, the infestation being cleared up by 1923, when two attacked trees were discovered.

The death of sal trees may be due to various causes, few of which preclude attack by borers afterwards. The outturn of dry trees may, therefore, be taken in most localities as an index of the amount of damage by *H. spinicornis*. Protection can be assured by surveying forests that have been left unworked for more than five years in the autumn and winter for dead and insect-attacked trees, which should be cut out and removed before the next rains. The felling should continue in the following years in those areas where the infestation remains higher than 1 per cent. of the growing stock (or alternatively one tree per acre). Except in unusually remote areas, these fellings should pay for themselves. The main object of subsidiary fellings of this nature is the reduction of the proportion of borer-damaged timber in the regular coupes and the consequent improvement in the reputation of the forest. It should be evident that it is worth while recording the proportion of dry wood in the annual coupes of all sal forests, and that in many divisions the institution of the short-cycle protective fellings would be profitable.

VAN DER GOOT (P.). **Overzicht der voornaamste ziekten van het aardappelgewas op Java.** [Survey of the Principal Diseases of the Potato in Java.]— *Inst. Plantenziekten*, Bull. 18, 44 pp., 11 pls. Buitenzorg, 1924.

The insect pests of potatoes in Java are the following, given in order of their importance as regards this plant :—

The Coccinellid, *Epilachna vigintioctopunctata*, is injurious in the larval and adult stages. In the cool hill climate the adults can live for 3 months, and serious outbreaks sometimes occur. Bad weather is the chief controlling factor. According to observations, which,

however, require confirmation, no eggs are laid in the hill districts during a certain period of the dry season. For this reason fields planted in the full dry season are rarely infested to any extent. Remedial measures are, therefore, necessary usually only from May to June. European growers resort to collection of the adults, but this is not worth while, nor is collection of the egg-masses much better. The collection of the larvae when the plants are 7–8 weeks old is advisable, as the larvae are then not more than 3 weeks old and have not entered the voracious 4th stage. A spray containing 2 per cent. lead arsenate and 2 per mille soap is effective but costly. *Solanum torvum* is the principal wild food-plant, and in West Java a weed, *Datura stramonium*, also harbours the pest. *D. suaveolens*, contrary to general opinion, is not a food-plant.

Very little is known about the potato leaf-roller, *Phthorimaea* sp., which is sometimes a serious pest. The moths seem to oviposit by night on old potato plants, and early injury by the young larvae occurs there. The larval stage lasts at least 14 days, and the larva then abandons the leaf-roll and pupates at the surface of the ground. The moths emerge in 14–17 days, and the total life-cycle probably requires 5 or 6 weeks. Many of the almost mature caterpillars are sometimes parasitised by two Hymenoptera, one being an Ichneumonid. The pest occurs sporadically in the rainy season, but is general in the dry season, and becomes very harmful during a prolonged drought. Spraying with a 2 per cent. solution of lead arsenate is advised.

The potato tuber-moth, *Phthorimaea operculella*, has the following development at Buitenzorg. Eggs are laid within 24 hours of emergence. Incubation lasts 4–5 days, the larval stage 14, and the pupal 7. Up in the hills, however, the life-cycle requires about 45 days. All potato storehouses and seed potatoes should be fumigated with carbon bisulphide. Lamps placed over trays of oil and water may be used as traps in the stores.

The leaf-eating caterpillars, *Heliothis assulta*, *Prodenia litura* and *Phytometra chalcites* occasionally cause serious injury during the dry season. Collection is the remedy advised. The cutworm, *Agrotis ypsilon*, is especially troublesome in fields of young plants. Collection is considered more satisfactory than the use of poison-baits.

The larvae of *Holotrichia javanica* attack the tubers, but apparently not the roots or stems. In 1922 the beetles were swarming about March. They probably oviposit in the second half of the rainy season, and the larvae feed on weeds until these become scarce during the dry season and injury to the potato tubers begins. It is not known whether there is a second generation, but it would do little damage owing to the abundance of weeds then available.

Very little is known about the damage done by mole-crickets, *Gryllotalpa africana* (?), but cases of serious injury have been noticed in the dry season. Infestation by the bugs, *Nezara viridula*, *Lygus solani* and *Cletus punctulatus*, does not warrant remedial measures. Collection may be resorted to in the case of the first-named, which is sluggish in its movements. During the dry season *Thrips tabaci* has been seen attacking potato foliage, but the damage done is unimportant.

The Nematode, *Heterodera radicicola*, has been a pest of slight importance up to the present; its spread can best be prevented by crop rotation.

It should be noted that figures 3 and 4 of Plate V. are transposed.

Duport (L.). **Rapport sur quelques-unes des recherches poursuivies à la Station [Entomologique de Cho-Ganh] en avril et mai 1924.**—*Sta. Ent. Cho-Ganh, Bull. périodique*, no. 20, 3 pp. Hanoi, 1924.

The rearing of *Doryctes strioliger*, Kieff., has been continued successfully, 90,000 having been reared in May, against 20,000 in April. This Braconid can, however, only work effectively against the coffee borer, *Xylotrechus quadripes*, Chev., on young bushes with sparse foliage or where the stems are easily accessible. The breeding of the Bethylid, *Sclerodermus domesticus*, Kieff., has been normal, and 53 individuals of *Doryctes picticeps*, Kieff., and 494 of *D. tristriatus*, Kieff., have been obtained.

Cecconi (G.). **Manuale di Entomologia Forestale.**—pp. i–xix & 593–680, 69 figs. Fano (Marche), 1924. Price Lire 110.

This tenth and final part of this excellent manual on forest entomology [*cf. R. A. E.*, A, x, 628] concludes the section on Hymenoptera, and contains the title-page, preface and indices to the complete volume of 680 pages illustrated by 786 figures, the majority of which are original. There are three indices, for insects, plants and remedies respectively. The book is obtainable from the author at the Osservatorio delle Malattie delle Piante, Fano, Italy.

Entomologia Agraria. Manuale sugli insetti nocivi alle piante coltivate, campestri, orticole ed ai loro prodotti e modo di combatirli. [Agricultural Entomology. A Manual of Insects injurious to cultivated Plants, Field and Garden Crops, and their Products, and Methods of combating them.]—2nd edn., 512 pp., 420 figs. Florence, R. Stazione di Entomologie Agraria, 1924. Price Lire 45.

This is a second, enlarged and improved, edition of the work first issued in 1915 [*R. A. E.*, A, iv, 53] on Italian insect pests. The original arrangement of the text has been retained, and the volume remains a practical guide of high value.

Baudyš (E.). **Přispěvek k rozšíření červců v Čechách.** [Contribution to the Distribution of Coccids in Czecho-Slovakia.]—*Časopis Českoslov. spolec. ent.*, xxi, no. 1–2, pp. 18–22. Prague, 25th March 1924. [Received 20th October 1924.]

The Coccids are listed under the food-plants, with brief notes on their local distribution.

Rambousek (—). **Rübenschädiger im Jahre 1923.** [Beet Pests in 1923.]—*Zeitschr. Zuckerind. tschechoslovak. Republik*, 1924, pp. 279–284. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes*, 1924, no. 3, p. 16. Vienna, 1924.)

In 1923 sugar-beet in Czecho-Slovakia was attacked by weevils, wireworms, Nematodes, flea-beetles, the cutworm [*Euxoa segetum*], Melolonthid larvae, Aphids, etc. In Bulgaria *Laphygma* (*Caradrina*) *exigua*, Hb., and in Jugo-Slavia, *Gryllus desertus*, Pall., are said to be important pests of beet.

Wolff (—). **Ueber Blattwespenfrass auf** *Sorbus aucuparia.* [On Injury to *S. aucuparia* by Sawflies.]—*Zeitschr. f. Forst- u. Jagdwesen,* lvi, pp. 38–46, 1924. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes,* 1924, no. 3, p. 16. Vienna, 1924.)

In June and July 1923 *Sorbus aucuparia* at Freienwalde was defoliated by the larvae of *Pristiphora geniculata,* Htg., which has two generations a year, the first one having finished feeding by the end of June. The larvae of the second generation are often destroyed by a fungus. This is the first recorded case of definite injury by this sawfly.

Fruhwirth (—). **Mohnrüssler.** [Poppy Weevils.]—*Wiener landw. Ztg.,* lxxiii, p. 250. Vienna, 1923. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes,* 1924, no. 3, p. 20. Vienna, 1924.)

In 1923 *Ceuthorrhynchus macula-alba,* Hbst., was unusually abundant in Hungary, and infestation of poppies by it was general; sometimes several weevils were found in one green capsule. The uprooting of the poppy plants and the subsequent thorough working of the soil, which destroys the larvae, pupae and hibernating adults, are the measures advocated.

Eckstein (—). **Die Kiefern- oder Forleule** *Noctua piniperda.* [The Pine Moth, *Panolis flammea.*]—*Deutsche Forstzeitg.,* xxxix, pp. 265–267 & 291–294, 1924. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes,* 1924, no. 3, p. 23. Vienna, 1924.)

This is an account of the biology of the pine moth, *Panolis flammea* (*Noctua piniperda*). If the ground litter is raked into heaps, the heat produced by decomposition kills the pupae or affects the vitality of the resulting moths. Furthermore, the pupae left on the bare ground are devoured by natural enemies, and any larvae developing there die of starvation. The spread of the larvae can be checked by trenches.

Monnier (—). **Oiseaux insectivores et sylviculture à Madagascar.**—*Rev. franç. d'ornithologie,* 1923, no. 179, 4 pp. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes,* 1924, no. 3, p. 24. Vienna, 1924.)

Before the French occupation, the highlands of Madagascar were covered with grass, but pines, oaks, *Eucalyptus, Grevillea* and *Acacia mollissima* have been planted freely. As a result the caterpillars of *Deborrea malgassa,* Hely, appeared in large numbers and caused total defoliation. A native forest bird, *Leptosomus discolor,* then migrated to the highlands, wiped out the pest, and has now established itself on them.

Höltzermann (F.). **Rübenrüsselkäfer.** [Beet Weevils.]—*Deutsche landw. Presse,* l, pp. 376–377. Berlin, 1923. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes,* 1924, no. 3, p. 26. Vienna, 1924.)

Bothynoderes (*Cleonus*) *punctiventris* is the chief pest of sugar-beet in southern Russia. The best method of checking it is to grow beet as far as possible from any beet cultivation of the preceding year. All natural obstacles to migration, such as streams or wide tracts of forest or meadow, should be made use of. This pest is now unknown in Czecho-Slovakia, where the above procedure has been employed.

[Vasilev (I. V.).] **Васильев (И. В.). Вредители хлопчатника.** [Cotton Pests.]—**Хлопковое Дело** [*Cotton Indust.*], iii, no. 7–8, pp. 86–116, 37 figs. Moscow, July–August 1924.

The majority of the pests that attack cotton in the cotton-growing area from Transcaucasia to Turkestan are general feeders. *Anthonomus* [*grandis*] and *Platyedra* (*Pectinophora*) *gossypiella* have not yet been recorded, their absence and that of many southern tropical pests being due to the peculiar climatic conditions and methods of cultivation necessitating artificial irrigation.

An account is given of the many insect pests that occur, with biological notes and recommendations for their control [*cf. R. A. E.*, A, ii, 311]. *Tetranychus telarius* (red spider) is one of the most serious pests, overwintering in the fields that have been subject to its attack. Its more important natural enemies are *Stethorus* (*Scymnus*) *punctillum* and *Pullus* (*S.*) *subvillosus* and their larvae, the larva of *Arthrocnodax tetranychi*, the predacious bugs, *Triphleps niger* and *T. albidipennis*, and a thrips, *Scolothrips sexmaculatus*. Considerable injury is caused in some years by *Heliothis obsoleta*, which apparently has three generations in the warm part of the year and hibernates in the pupal stage. It is particularly injurious in eastern Transcaucasia, Azerbaijan, Armenia and partly in Georgia, the August generation causing most injury, whilst in the Tejend and Merv region the July generation is most injurious. *Aphis gossypii* is widely distributed, its natural enemies including various predacious larvae, *Aphidoletes*, *Syrphus* and *Leucopis*, as well as parasites of the genus *Aphidius*. During the summer 13 generations may occur, and the Aphid may remain on cotton throughout the entire period of vegetation, *i.e.*, from the end of April to the end of November. With the advent of frosts it migrates to neighbouring weeds, on which it remains throughout the winter, being able to withstand temperatures as low as −11° C. [12·2° F.], and continues viviparous reproduction during the warmer winter days. *Thrips flavus* migrates to cotton from neighbouring weeds and lucerne, on which it may be found the whole year round. *Euxoa segetum* has been observed throughout the area under consideration, the form occurring in Turkestan being *E. segetum* var. *pallida*. Injury to cotton is caused by the larvae of the first generation, the moths being on the wing as early as April and laying their eggs on weeds and the cotton seedlings, and possibly directly on the soil. Of less importance are wireworms of the genus *Athous*. Locusts are serious though occasional pests of cotton, particularly *Dociostaurus maroccanus* and to a less extent also *Calliptamus italicus* and *Locusta migratoria*. In some years injury is caused by the larvae of *Laphygma exigua* in Turkestan. *Acronycta rumicis* occasionally feeds on the leaves of cotton, the injury being most prevalent in shaded parts of the plantation usually close to wayside plants. This species and *Polia suasa* (*Mamestra dissimilis*) are not, however, of very great importance. In Transcaucasia young cotton plants are frequently injured by *Phytometra gamma*, in association with which *P.* (*Plusia*) *circumflexa* may also be found. In the Samarkand region *Amicta armena* has been recorded from cotton. Other species are *Pyrausta nubilalis* from Turkestan and Transcaucasia; *Phlyctaenodes* (*Eurycreon*) *nudalis* from Transcaucasia; *Platyedra vilella* from Turkestan and Transcaucasia; *Tortrix* (*Cacoecia*) *strigana* from Transcaucasia; *Eucosma* (*Epiblema*) *luctuosana* from Azerbaijan; *Pandemis chondrillana*; *Tortrix* (*Cacoecia*) *reticulana*; *Podagrica*

malvae from Transcaucasia ; *Haltica tamaricis* ; *Mylabris* (*Zonabris*) *frollowi* ; *M. cincta* ; *M. impar* ; and the Aphids, *Acyrthosiphon gossypii*, *A. vasilievi*, *Aphis rumicis*, and, on the roots, *Tychea* sp. Other sucking insects injurious to cotton are *Adelphocoris lineolatus*, *Camptobrochis punctulatus*, *Liorhyssus hyalinus*, *Nysius graminicola*, *Orthotylus flavisparsus*, *Chlorita bipunctata*, *Agallia sinuata*, and *Monasteira inermis*. The last named lives on willows and poplars, but may fall from these on to the leaves of the cotton plant, where it successfully reproduces and causes small light spots as a result of feeding. Less important insects feeding on cotton are *Heliothis dipsacea*, *H. peltigera*, *Orthacanthacris* (*Acridium*) *aegyptius*, *Thysoicetrus pterostichus*, *Gryllus desertus*, *Gryllotalpa gryllotalpa*, *G. unispina*, and *Agromyza flaveola*.

Vayssière (P.). **Le Problème Acridien et sa solution internationale.**— *Matériaux pour l'étude des calamités*, no. 2, pp. 122–158, 1 map. English Summary, pp. 160–162. Geneva, July–September 1924.

A general outline of the distribution of the locust areas of the world is given, and the great economic importance of locusts is strongly emphasised. Knowledge of these insects and of their bionomics is very limited, and a review of recent work by Uvarov [*R. A. E.*, A, ix, 561 etc.], Faure [xi, 507]and Plotnikov [xii, 226] indicates the necessity of developing new lines of investigation.

Consideration of the control measures that have proved effective against locusts leads to the conclusion that the technical means for satisfactory control are quite adequate and that unsatisfactory results in most cases are due entirely to bad organisation.

In discussing the possibility of an international organisation of anti-locust work, the author states that the Rome Conference of 1920 [*R. A. E.*, A, ix, 490] had no practical effect, as the Convention concluded at the Conference contained no allusion to international organisation of research, nor has the question of financing international anti-locust work been raised.

The scheme proposed by the author is as follows :—

The International Institute of Agriculture at Rome should be recognised as a central anti-locust station. A special entomologist should be attached to co-ordinate and to facilitate research on locusts in different countries.

Countries should be organised in groups embracing entire natural areas of certain species of locusts, and having a regional anti-locust station for administrative work and for research.

A service should be organised in each country for the actual control of locusts, and having, if possible, a technical staff qualified for making observations on their bionomics ; and observation posts should be established for collecting information on the movements of locust swarms.

Schneider-Orelli (O.) & Leuzinger (H.). **Vergleichende Untersuchungen zur Reblausfrage.** [Comparative Researches on the *Phylloxera* Question.] — *Vierteljahrsschr. Naturf. Ges. Zurich*, lxix, 1924, Beiblatt no. 5, pp. 1–50, 13 figs., 1 col. pl. Zurich, 1924.

Börner has concluded that two species of *Phylloxera* occur on vines, a northern European form, *P. vastatrix*, and a southern, *P. vitifolii*.

According to him, these are differentiated biologically by their infestation of vines, and also morphologically ; the older stages of *P. vastatrix* (in Germany and North Switzerland) have the two marginal tubercles on the third thoracic segment separated, while in *P. vitifolii* (Austria and southern France) these are fused. He has, however, found numerous transitional forms between these. He supposes that both species came from America, and now occur in southern Europe, but that *P. vastatrix* only has extended to Germany. Varieties of American vines hitherto found immune from *P. vastatrix* can be infested by *P. vitifolii*.

On the other hand, the authors' observations indicate that no constant morphological difference can be found, and that vines that are supposed to be attacked only by the southern *P. vitifolii* (such as Riparia-Rupestris 3309) harbour Aphids with the morphological characters of *P. vastatrix*. The material used by the authors was obtained in Germany, German, French and Italian Switzerland, and the South of France. The technique employed and the data obtained in a long series of examinations are described in detail. Thus there is no reason for assuming the introduction into Europe of two different species, and the theories based thereon cannot be maintained.

Delassus (M.). **La Mouche de l'olive.**—*Rev. hortic. Algérie*, xxviii, no. 9, pp. 193–195. Algiers, September 1924.

The various remedies adopted against the olive fly [*Dacus oleae*] in different countries are briefly reviewed. The bait-spray recommended by Berlese is advised, the formula given being 1 lb. molasses and ⅛ oz. sodium arsenite in 1 gal. water. One application is generally sufficient, but for heavy infestations two or three should be given. In Algeria, the fly generally appears towards the end of May, and spraying should be started in early June. The possibilities of using the biological method against *D. oleae* are also discussed. The Braconid, *Opius concolor*, is known to occur in Tunis in large numbers, and to a certain extent also in Algeria ; its exact distribution there should be determined so that its dissemination in all parts could be arranged.

" Moschicida " contro la mosca delle olive. [" Moschicida " for Use against the Olive Fly.]—*L' Agricoltura Toscana*, xvi, no. 11–12, pp. 167–168. Florence, 1924. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 3, p. 739. Rome, July-September 1924.)

Realising the importance for olive growers of having a readily available mixture of molasses and sodium arsenite for poisoning the olive fly [*Dacus oleae*], Prof. A. Berlese has arranged for this preparation to be manufactured. This mixture has a guaranteed content of over 90 per cent. molasses of consistency 1·41, in the proportion of 40–45 of sugar to 2·5 of sodium arsenite, every sample being tested by the Royal Agricultural Entomological Station at Florence. The mixture only requires dilution with 9 parts of water, is cheaper than the home-made article, and obviates all error in compounding. As only about 10 oz. of spray is required per tree for one application, over 3,000 olive trees can be sprayed once at a cost of less than £1.

PORTARO (V.). **Una nueva plaga de la caña en el país.** [A new Pest of Sugar-cane in Peru.]—*La Vida Agrícola*, i, no. 2, p. 59 bis, 1 fig. Lima, 1924. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 3, p. 741. Rome, July-September 1924.)

A Melolonthid beetle of the genus *Ancistrosoma* is recorded as new to Peru, where it attacks sugar-cane. The larvae live underground and feed on the roots. The plant may be killed if the larvae are numerous, and once established between the roots they are difficult to deal with. Early in the infestation the best method is to keep the plant dry, since the larvae die if during their early life they are in compact soil, devoid of moisture. If the attack is of some months' standing, the land should be kept fallow; but if this is too costly, a concentrated solution of copper sulphate should be introduced under each plant after the soil has been kept dry for a short time; 10 days later, water with sodium nitrate in solution is given to encourage growth. In the case of badly affected canes, the soil cannot be kept dry, because before the insect feels the lack of moisture the cane may die. The adult beetles may be captured easily and at small cost; they are found at dawn and in the evening on the leaves and branches of trees near sugar-cane.

LEMÉE (—). **Ravages du Géophile sur les pommes de terre.**—*C. R. Acad. Agric. France*, x, no. 28, pp. 789–791. Paris, 1924.

The Myriapod, *Geophilus longicornis*, was very destructive in certain soils in France in 1924, especially to potatoes, which were riddled with galleries, so that a large part of the crop was a total loss. The usual remedy, of injecting carbon bisulphide or sulphuretted hydrogen into the soil, being costly and difficult in practice, a trial with sylvinite is suggested, which is said to have been very successful in Belgium against white grubs [*Melolontha*] at the rate of nearly half a ton per acre.

V[AYSSIÈRE] (P.). **L'aviation contre les insectes du Coton.**—*Agron. colon.*, no. 81, pp. 87–89. Paris, September 1924.

The tests here described for the application of dusts by aeroplanes against cotton pests have already been noticed [*R. A. E.*, A, xii, 164].

FERRIÈRE (C.) & FAURE (J. C.). **Sur *Trichogramma evanescens*, Westw., parasite des œufs de *Pieris brassicae*, L.**—*Rev. Path. vég. & Ent. agric.*, xi, pt. 2, pp. 104–118. Paris, April-June 1924.

During the summer of 1923 *Trichogramma evanescens*, Westw., was found to be parasitising up to 90 per cent. of the eggs of *Pieris brassicae*, L., this degree of infestation being limited to an isolated locality near Lyons. Parasitised eggs were found from August to the beginning of September, the life-cycle of the parasite from egg to adult being from 12 to 15 days during August. The parasite will lay its eggs in those of the host in any stage of development, but where development is advanced the emergence of the larva is not interfered with. Parasitism of *Pieris brassicae* is only occasional, depending on the availability of other hosts.

In all 11 species of *Trichogramma* have been recorded from Europe, the hosts belonging to five orders, mostly Lepidoptera. The records are reviewed and the relations of these species are discussed, the authors being inclined to the view that only a single species, *T. evanescens*, really exists. An extensive bibliography is appended.

TREHERNE (R. C.). **Les vers fil de fer et les moyens de les détruire.**—*Progrès agric. & vitic.*, lxxxii, no. 41, pp. 355–358. Montpellier, 12th October 1924.

This paper on the control of wireworms is a translation of one already noticed [*R. A. E.*, A, xi, 363].

LIBES (R.). **Emploi du paradichlorobenzène contre les insectes du sol.**—*Progrès agric. & vitic.*, lxxxii, no. 43, pp. 400–403. Montpellier, 26th October 1924.

The use of paradichlorobenzene against the peach root borer [*Aegeria exitiosa*, Say] in the United States of America is discussed, and recent experiments in France for the control of *Capnodis tenebrionis*, L., are described. The biology of this Buprestid is apparently similar to that of *A. exitiosa*. *C. tenebrionis* has been responsible for killing 5 per cent. of the cherry and plum trees in certain orchards. In the south of France it also attacks sweet briar and wild plums and possibly cultivated apricots. The larval galleries are found in the subterranean part of the cherry tree, particularly between the wood and bark. The adults appear in June and may be found on the branches, where it is thought that they cut the peduncles of the leaves. The time recommended for treatment against *A. exitiosa* (25th September to 15th October), which oviposits from 15th August to 15th September, will also probably be effective against *C. tenebrionis*. Should autumn treatment be impossible, it may be done in the spring (1st to 20th May).

SOURSAC (L.). **L'***Icerya purchasi* **en Roussillon.**—*Progrès agric. & vitic.*, lxxxii, no. 43, pp. 404–406. Montpellier, 26th October 1924.

A general account is given of the life-history of *Icerya purchasi*, its introduction and spread along the south coast of France, and the usual remedial measures, including biological control.

DU BUYSSON (H.). *Yponomeuta cognatella* **Treitsch. et son parasite** (*Discochaeta evonymellae*, **Ratz.**).—*Rev. scientif. Bourbon. & Centre France*, 1924, no. 3, p. 144. Moulins, October 1924.

The Tachinid, *Discochaeta euonymellae*, Ratz., is recorded as parasitising the cocoons of *Hyponomeuta cognatellus*, Hb., infesting apples in France.

SERGENT (ED.) & ROUGEBIEF (H.). **Dissémination des levures dans les vignobles par les insectes. Mutualisme entre levures et Drosophiles,** —*C. R. hebdom. Acad. Sci.*, clxxviii, no. 8, pp. 732–734. Paris, 1924.

Experiments with vines in cages to determine whether vine yeast is carried by insects show that flies of the genus *Drosophila* are important agents, causing a mutual benefit. On the one hand, the fly spreads the

yeast on the skin of the ripe grapes, and, on the other, the yeast in the fermenting new wine (must) supplies the fly larvae derived from the eggs laid on the grapes with a suitable medium for development.

MARCHAL (P.). **Contribution à l'étude des migrations chez les Eriosomiens.**—*C. R. hebdom. Acad. Sci.*, clxxviii, no. 9, pp. 737–739. Paris, 1924.

Eriosoma ulmosedens is an Aphid that does not conform to the general type of allied Aphids, which have an annual cycle characterised by migrations from the elm as a primary food-plant to some other plant, such as currant, pear, apple, etc. In the case of *E. ulmosedens* the offspring from the winged forms that appear in rosettes on the shoots of elm, *Ulmus campestris*, during the summer, is mixed, being composed of both asexual and sexual forms. The sexual forms may be produced in numbers. This implies that to return to the sexual generation, starting from the fertile egg and passing through the annual series of parthenogenetic generations, there is no necessity, in the case of this species, to migrate from the elm to another plant. The possibility is not excluded of a partial migration of *E. ulmosedens* to an unknown plant by means of winged forms that develop precociously on elm shoots, and of which the descendants are chiefly asexual forms. Although such an intermediary plant has not yet been found, it may be admitted that there are two categories of sexuparous forms in this species, one sedentary on the elm, and the other re-migratory. *E. ulmosedens* thus corresponds to a stage of evolution for which the separation of the species into distinct and specialised lines for different food-plants is still incomplete.

WATSON (J. R.). **A New *Bregmatothrips* (Thysanoptera) from England and Holland.**—*Ent. Mo. Mag.*, lx, pp. 253–254. London, November 1924.

Bregmatothrips iridis, sp.n., here described, was intercepted at New York on *Iris kaempferi* from Holland and *Iris* from England.

THOMPSON (M.). **The Soil Population. An Investigation of the Biology of the Soil in certain Districts of Aberystwyth.**—*Ann. App. Biol.*, xi, no. 3–4, pp. 349–394, 7 figs. Cambridge, October 1924.

An attempt is made to give an account of a systematic qualitative and quantitative seasonal investigation of the macroscopic soil fauna of a limited area, chiefly under grass, but with some cultivated land, and to correlate the data obtained with the general environmental conditions. Organisms injurious to vegetation were found to be present in all areas, but not usually in sufficient numbers to cause any damage, except in the case of some cultivated land in which the roots of perennial rye grass were eaten away by the Diplopod, *Polydesmus collaris*.

FISHER (R. C.). **The Life-history and Habits of *Tortrix pronubana*, Hb., with Special Reference to the Larval and Pupal Stages.**—*Ann. App. Biol.*, xi, no. 3–4, pp. 395–447, 1 pl., 16 figs. Cambridge, October 1924.

Tortrix pronubana, Hb., which has long been known as a minor pest of many plants in the open air in Britain, has recently been found in large numbers in the glasshouses at Kew, where it feeds on all kinds of

plants at temperatures varying between 50° and 60° F. Lists of plants on which the larva is found under glass and in the open are given in an appendix; it has a wide range of food, including plants of many natural orders. The larvae feed on the leaves, spinning together the young tips, and also attack unopened buds, the only sign of infestation being a small round hole, though the bud may be entirely eaten away within. Holes are also made in the petals of flowers. Glasshouses can be protected from this pest by the use of insect-proof screens of wire gauze or muslin, fitted to cover all openings when the windows are open, to prevent the entrance of any moths. Two main generations occur in a year, a summer one that emerges from eggs laid in spring, and a winter one emerging from eggs laid in autumn. In the laboratory, at a temperature of 50° to 60° F., larvae continued to feed slowly throughout the winter months and showed no sign of hibernating. The larval stage of the winter generation was prolonged to 5–7 months, the first pupa being obtained in March. The pupal period of the winter generation varied from 11 to 45 days, and that of the summer generation from 11 to 17 days. Moths of the winter generation appear in April, and continue to emerge throughout the spring. The first eggs of the summer generation are laid from mid-April onwards. In the laboratory the minimum length of the larval stage was 68 days, while the pupal period averaged 15 days. Moths of the summer generation emerge from early August, when they deposit the first eggs of the winter generation. There is marked overlapping of the generations, and under glass all stages of larvae can be found throughout the year. Great variation occurs in the duration of the instars, and it is almost impossible to follow individuals from stage to stage; this has, however, been done so far as possible, the lengths of the instars observed being shown in a table. A description of the external morphology and chaetotaxy of the larva is given.

Spraying with nicotine or lead arsenate is effective against *T. pronubana* under glass if applied before and immediately after the eggs hatch, that is, before the larvae begin to spin their webs. Destruction of the larvae by hand-picking is effective, but the minute first and second stage larvae are easily overlooked; this method should be combined with spraying. Fumigation with hydrocyanic acid gas proved ineffectual against the larvae. Two unidentified Hymenopterous parasites were bred from the larvae and pupae, but the percentage of parasitism was extremely low.

Fryer (J. C. F.) & Collin (J. E.). **Certain Aspects of the Damage to Oats by the Frit Fly.**— *Ann. App. Biol.*, xi, no. 3–4, pp. 448–464, 3 figs. Cambridge, October 1924.

This is a study of the main attack of the second generation of the frit-fly (*Oscinella frit*, L.) on oat grains. From experiments in progress some years ago the value of early sowing of wheat was conclusively shown, 4 per cent. of early sown grain being infested, and 16 per cent. of that sown later. In 1918 and 1919 samples of oats obtained from all over the country showed that damage from the second generation of the fly was severe. An attempt at screening the plants at various stages of their growth, in order to determine whether there was a critical period in the blossoming or early stage of the oat-panicle when the plant was most susceptible, was not entirely successful, but the results are given in detail and indicate that it may be possible

to sow the oat crop too early. It was found that the period of maximum susceptibility of the oat spikelet lies approximately at the time of fertilisation.

Tests to determine the susceptibility of different varieties were not conclusive, but as a result of these tests a list is given of thirteen varieties in the order of their susceptibility, so far as it is known.

Cunliffe (N.) & Fryer (J. C. F.). *Oscinella frit*, **Linn. An Investigation to determine how far varietal Differences may influence Infestation of the Oat Plant.**—*Ann. App. Biol.*, xi, no. 3–4, pp. 465–481. Cambridge, October 1924.

The following is part of the authors' summary:—Twelve varieties of oats [which are enumerated] have been grown in widely separated localities, namely, Sandford, Oxon, and Harpenden, Herts, where they were subject to the attack of *Oscinella frit*, L. The infestations of stem and grain were observed in detail, and the values obtained subjected to statistical analysis. The stem infestation showed an increase of 11 per cent. only, 18 days after 7th June [when the first inspection was made]. The attack on stems 12 in. in length and over (including blades) was only one-third as intense as that on the remaining stems; 20 per cent. of the former were rendered incapable of producing panicles; 25 per cent. of the hidden buds plus small tillers were destroyed. Infestation away from the growing point averaged 2 per cent. The infestation of the main grain reached 45·9 per cent. against 22·8 per cent. for the bosom grain, at Oxford, indicating the importance of the time factor. The production of "blind" glumes (*i.e.*, those containing undeveloped seed, causal agent unknown) was considerable (7–9 per cent.), but independent of frit infestation of grain. The correlation between stem infestations at Oxford and Harpenden was high, but the grain infestations showed no correlation whatever; neither was there any definite evidence of correlation between stem and grain infestation in either locality. No correlation between infestation and tillering capacity was discovered, but the production of vigorous stems was decidedly correlated with the absence of infestation. Weighted mean differences in mean percentage infestations both for stem and grain are recorded for each variety.

Petherbridge (F. R.) & Cowland (J. W.). **The Apple Bud Weevil, *Anthonomus cinctus*, Koll.**—*Ann. App. Biol.*, xi, no. 3–4, pp. 482–497, 1 pl., 10 figs. Cambridge, October 1924.

The authors' summary of this paper is as follows:—*Anthonomus cinctus* is widely distributed on the Continent and occasionally, in certain districts, does serious damage to pear buds, and now and then is found injuring apples. In Britain it has not yet been recorded on pears, but was found killing apple buds at Wisbech in 1921 and near Cambridge in 1922. Adults have also been found in Kent. The eggs are laid in apple buds (usually fruit buds) in the autumn, one egg only in each bud. The larva hatches at the end of February and eats out the succulent portion of the bud. It pupates in May and changes to the adult stage in June. The weevils puncture the leaf stalks, buds and succulent portions of the shoots. A description of the various stages is given. A comparison is made between this species and those closely allied to it. Near Cambridge *Pimpla pomorum* killed most of the larvae and pupae left on the trees after collecting.

Williams (L.). **Notes on the Biology of** *Pseudococcus gahani*, **Green.**— *Ann. App. Biol.*, xi, no. 3–4, pp. 498–502. Cambridge, October 1924.

Pseudococcus gahani, which is indigenous to the British Isles, has previously been recorded by Green as occurring upon *Ribes*, *Ceanothus*, *Laburnum* and potato tubers. On the last named the female passes through five stages, and the male through six. The whole life-period, from the time the eggs are laid to the formation of the ovisac in females of the new brood, is about six months, the duration of life of the male ranging between 20 and 24 weeks. There is thus little likelihood that this Coccid will become a troublesome potato pest, as there seem to be only two generations a year.

[Levitt (M. M.) & Shpet (G. I.).] **Левитт (М. М.)и Шпет (Г. И.). К познанию внутреннего иолового аппарата листоедов (Coleoptera, Chrysomelidae).** [Contribution to the Knowledge of the internal Genital Apparatus of Leaf-eaters (Coleoptera, Chrysomelidae).]— **Доклады Росс. Акад. Наук** [*C. R. Russ. Acad. Sci.*], 1924, pp. 67–70. [Leningrad, 1924.]

The contents of this paper are indicated by its title.

Juillet (A.). **Propriété et mode d'emploi du savon-pyrèthre.**—*Rev. agric. Afr. N.* xxii, no. 272, pp. 667–671, 1 fig. Algiers, 17th October 1924.

The importance of using pyrethrum-soap solution in the right way is explained, and a list is given, under the headings of susceptibility or non-susceptibility to the insecticide, of insect pests (under the French popular names only) attacking various crops. The method of preparing the solution and suitable apparatus for its application are described, and special instructions are given regarding the spraying of different crops for the particular pests that attack them.

Hirst (S.). **On some New Species of Red Spider.**— *Ann. & Mag. Nat. Hist.*, xiv, no. 83, pp. 522–527, 1 fig. London, November 1924.

The species described are *Raoiella indica*, gen. et sp. n., from India on coconut leaves; *Tetranychus fijiensis*, sp. n., from Fiji on coconut; *Paratetranychus iseilemae*, sp. n., from S. India on leaves of *Iseilema laxum*; *Tetranychus* (*Schizotetranychus*) *hindustanicus*, sp. n., from S. India on *Citrus*; and *Paratetranychus pini*, sp. n., on *Pinus sylvestris* (previously recorded by the author as *P. ununguis*) and *P. ununguis*, Jac., on spruce, both from England.

Sicard (A.). **Un** *Scymnus* (*Pullus*) **nouveau de Mexique (Col., Coccinellidae).**— *Ann. & Mag. Nat. Hist.*, xiv, no. 83, pp. 531–532. London, November 1924.

Scymnus (*Pullus*) *uncinatus*, sp. n., here described, is a Mexican species that has become acclimatised in Honolulu.

Sampson (W.). **A New Species of Platypodidae from Pretoria, South Africa.**— *Ann. & Mag. Nat. Hist.*, xiv, no. 83, p. 545. London, November 1924.

Platypus varius, sp. n., is described from South Africa, where it was found boring into *Molletia sutherlandi*.

van Someren (V. G. L.) & Hunt (J. W.). **Notes on the Life-history of the Black Rose Chafer** (*Diplognatha silacea*, **Macl.**).— *Jl. E. Africa & Uganda Nat. Hist. Soc.*, no. 19, pp. 3–6, 1 pl. Nairobi, September 1924.

The black rose-chafer, *Diplognatha silacea*, Macl., is perhaps the commonest of all the rose beetles in Nairobi and its vicinity, and does great damage to roses, eating the youngest shoots and flowers, particularly the half-formed buds. Besides attacking roses, it sucks the juices of fruit trees, such as apple, plum and peach, selecting injured parts of the bark. Ripening fruits are also attacked. A list is given of the indigenous plants on which the adult has been found feeding. In a colony of beetles breeding in an old grass thatch, eggs, larvae in various stages, pupae and adults occurred together. A captive female has been observed to oviposit over a period of a month. The pupal stage at room temperature lasted six weeks.

Fahmy (T.). **A Banana Disease caused by a Species of** *Heterodera*.— *Minist. Agric., Egypt*, Tech. & Sci. Serv., Bull. 30, 11 pp., 12 figs. Cairo, 1924.

Previous records of a disease of banana in Egypt, due to a species of *Heterodera* apparently distinct from *H. radicicola*, which have been published during the last 20 years, are briefly reviewed. A study of the disease has recently been made, some 70 banana plantations being surveyed in Upper and Lower Egypt and the Alexandria district. South of Asyût, although the disease occurred in all provinces, banana growing did not seem to suffer severely; north of Asyût the disease was so serious as to render some plantations worthless. In Lower Egypt, conditions for banana growing are not good, and the disease often gets the upper hand. Alexandria seems to be the most profitable region for cultivation, the climate enabling good fruit to be grown in spite of the presence of the disease. Diseased plants appear to be suffering from starvation, and when examined the roots are seen to be knotted or to bear galls containing round bodies, which are the egg-sacs of the female Nematode. It is only when 30 per cent. or more of the roots are attacked that the disease becomes externally apparent; when over 50 per cent. are attacked, the roots become rotten and the leaves show a rosette condition. The life-history and habits of the Nematode are similar to those of *H. radicicola*. The female egg-sac rots away, liberating the eggs, many of which have already hatched, and the larvae live for a time free in the soil, but quickly attach themselves to a fresh root. The chief source of infection is the planting of infested suckers, and it seems probable also that this species of *Heterodera* attacks other plants in the same field as bananas, either weeds or minor crops, and may thus travel from plant to plant and from field to field. All varieties of banana seem to be affected, the

dwarf variety, *Musa cavendishi*, being perhaps the most susceptible. As the presence of organic matter in the soil is necessary for the development of the parasite, the possibility of substituting inorganic substances for the organic manure generally supplied to banana trees is discussed.

Much may be done to preserve the health of the plant by the application of artificial manures and by strict attention to hygiene. Toxic substances are practically unable to reach the Nematode in the tissues of the plant without destroying the plant also. Soil sterilisation remains the most feasible remedy for the disease, but every care must then be taken to prevent re-infestation. An extensive series of experiments on these lines is to be carried out.

HALL (W. J.). **Four New Species of Coccidae from Egypt.**—*Minist. Agric., Egypt*, Tech. & Sci. Serv., Bull. 46, 8 pp., 6 pls. Cairo, 1924.

The new species described, all from Graminaceous plants, are *Margarodes hirsutissimus*, found on *Imperata cylindrica*, between the leaf-sheaths and the parent stem, partly subterranean and partly above ground; *Pseudococcus variabilis*, attacking both root and crown of *Panicum* sp., and found between the leaf-sheath and parent stem on sugar-cane (*Saccharum officinarum*); *Trionymus polyporus*, from below the leaf-sheaths on millet (*Sorghum*); and *Lepidosaphes intermittens*, found low down between the leaf-sheaths on *Imperata cylindrica* and *Pennisetum dichotomum*.

WILLIAMS (C. B.) & KIRKPATRICK (T. W.). **A Multiple Temperature Incubator.**—*Minist. Agric., Egypt*, Tech. & Sci. Serv., Bull. 38, 4 pp., 9 figs. Cairo, 1924.

Incubators of a number of different types, designed for the study of cotton pests and their relation to climatic conditions, are described and figured. By their means, the death point of the insects, optimum temperature, lowest point of activity, etc., can be determined, and the rate of development at different temperatures can be compared. Although designed for entomological work, they should also be useful for research in chemistry, bacteriology and mycology.

KNOWLES (C. H.). **The Purple Leaf Moth of Coconuts in Fiji.** (*Levuana iridescens*, **Bethune-Baker.**)—*Agric. Circ. Dept. Agric. Fiji*, v, no. 1, pp. 1–14, 3 pls., 1 fig. Suva, January–June 1924.

In a foreword to this paper the chairman of the Levuana Control Committee, A. Despeissis, reviews the organisation of work in connection with *Levuana iridescens*, B.B., so far recorded from Vitilevu and some of the smaller surrounding islands. He also points out the value of recent information concerning an allied Zygaenid, *Brachartona catoxantha*, Hmps., in the Federated Malay States. This species is controlled by several Hymenopterous parasites, a Tachinid and a Phorid fly, and a parasitic fungus, *Botrytis necans*.

The information concerning *L. iridescens* is a reprint of a previous Bulletin [*R. A. E.*, A, xi, 118] with additional notes by A. M. Lea and H. W. Simmonds. Some of it has been noticed from other sources

[*R. A. E.*, A, vi, 237; xii, 298; etc.]. The eggs are laid in batches containing from 10 to 41, on the lower side of the coconut leaflets. They hatch in 7½ days. The larva begins feeding at once in a track parallel to the veins, the track becoming wider as the larva grows, and eventually occupying the whole space between the two veins. The larvae are mature in from 27 to 30 days, and spin their cocoons in sheltered positions at the base of the leafstalk, or occasionally on the lower surface of the leaf or on the leafstalk. When numerous the cocoons may overlap. The pupal stage lasts 13–14 days. The original description of the adult is quoted.

In discussing the natural enemies it is pointed out that *Tectocoris lineola*, F. [*R. A. E.*, A, x, 39] is a pest on cotton.

With regard to the migration of the females when food becomes scarce, they always follow the direction of the wind at the moment, should it be blowing with any strength. This fact helps to explain the disappearance and reappearance of the pest in various districts.

SIMMONDS (H. W.). **Cotton Insect Pests recorded in Fiji.**— *Agric. Circ. Dept. Agric. Fiji*, v, no. 1, pp. 61–62. Suva, January–June 1924. [Received 3rd November 1924.]

The species listed are :—Lepidoptera : *Earias fabia*, Stoll, probably the most serious pest in Fiji, though easily suppressed by early pinching off of the affected branch tips on the appearance of the first brood; *Platyedra* (*Gelechia*) *gossypiella*, Saund. (pink bollworm); *Anomis flava*, F., scarce and probably doing little damage; and *Stathmopoda trichrysa*, Meyr., *S. synchrysa*, Meyr., *Hieroxestis aurisquamosa*, Butl., *Pyroderces euryspora*, Meyr., *Labdia opisona*, Meyr., *L. calida*, Meyr., *L. allotropa*, Meyr., *Decadarchis heterogramma*, Meyr., and *Limaecia inconcinna*, Meyr., all of which are probably harmless rubbish feeders, only attacking damaged cotton. Rhynchota : *Dysdercus insularis*, Stål, and *D. impictiventris*, Stål (cotton-stainers), only the former having been found on cotton; *Tectocoris lineola*, F. (shield bug), a major pest common at times and generally accompanied by many rotten cotton bolls; *Saissetia nigra*, Nietn., not uncommon; *Hemichionaspis minor*, Mask.; a mealy-bug, probably *Pseudococcus virgatus*, Ckll.; and *Aphis gossypii*, Glov., damaging young plants only. Coleoptera : the Scolytid, *Hypothenemus gossypii*, Samp., feeding in damaged cotton seeds.

Heliothis obsoleta, F., which was thought not to occur in Fiji, has been bred from a larva attacking tomatos.

The Cotton Tip Worm (*Earias* **sp. and** *huegeli*).— *Agric. Circ. Dept. Agric. Fiji*, v, no. 1, p. 63. Suva, January–June 1924. [Received 3rd November 1924.]

The larvae of *Earias* sp. proved one of the most troublesome pests of cotton in 1923; they were however checked by cutting and destroying the affected shoots, and by burning the plants at the end of the picking season, allowing the ground to be ploughed. The eggs are laid on the tender growth. The larvae gnaw into the soft tipwood for about two weeks, and after feeding on the pith of the young wood, especially at the base of the shoots, they pupate. The second brood larvae appear at the time the squares form; they mine into the bolls, penetrate the seed, and cut the lint.

VEITCH (R.). **Establishment in Fiji of a Parasite of White Grubs.**— *Agric. Circ. Dept. Agric. Fiji*, v, no. 1, pp. 66–67. Suva, January–June 1924. [Received 3rd November 1924.]

Scolia manilae, Ashm., introduced from Hawaii into Fiji in 1917 and since thought to have died out, has been recovered 60 miles from the original point of liberation. It is apparently assisting in the control of white grubs over a large area; the species believed to be attacked are the Melolonthids, *Rhopaea vestita*, Arrow, and *R. subnitida*, Arrow, and the Rutelid, *Adoretus versutus*, Har. The parasite has been reared in captivity from the grubs of *A. versutus*, it has also laid eggs on *R. vestita*, but the resulting larvae and the host were destroyed by mites.

SIMMONDS (H. W.). **Coconut Spathe Borer** (*Acritocera negligens*).— *Agric. Circ. Dept. Agric. Fiji*, v, no. 1, pp. 67–68. Suva, January–June 1924. [Received 3rd November 1924.]

The Cossid, *Acritocera negligens*, Butler (coconut spathe borer) is one of the most serious pests of coconut in Fiji. A brief account is given of the injury caused, and the various stages are described. The eggs are laid in batches at the base of the leaves and not on the spathe [*cf. R. A. E.*, A, x, 214], so that the larvae have some distance to crawl before reaching the spike. In addition to the possible use of light traps, spraying the spathes of young trees with lead arsenate would probably reduce the infestation considerably.

Beneficial Ladybirds.— *Agric. Circ. Dept. Agric. Fiji*, v, no. 1, pp. 68–69. Suva, January–June 1924. [Received 3rd November 1924.]

The following species have been introduced into Fiji from Australia: *Orcus australasiae* and *O. chalybeus*, both feeding on scale-insects; *Leis conformis*, one of the most voracious aphis-eating Coccinellids; *Cryptolaemus montrouzieri*, predacious on mealybugs; and *Coccinella transversalis*. The last named is already present in Fiji.

Lantana Parasites.— *Agric. Circ. Dept. Agric. Fiji*, v, no. 1, p. 74. Suva, January–June 1924. [Received 3rd November 1924.]

In order to supplement the work of *Agromyza lantanae* in destroying *Lantana*, the flower-feeding butterflies, *Thecla agra* and *T. echion*, have been obtained from Honolulu. The former has become well established in Fiji, and it is hoped that the Agricultural Department will soon be able to deliver supplies of both species.

Banana Borer Control.— *Agric. Circ. Dept. Agric. Fiji*, v, no. 1, pp. 75–76. Suva, January-June 1924. [Received 3rd November 1924.]

Plaesius javanus, introduced into Fiji 11 years ago against *Cosmopolites* (*Sphenophorus*) *sordidus* (banana beetle borer), has now become well established, and the Department of Agriculture is prepared to supply colonies of these beetles. They are also said to attack the larvae of *Rhabdocnemis* (*S.*) *obscura* (sugar-cane weevil).

The Banana and its Cultivation, with special Reference to the British Empire.—*Bull. Imp. Inst.*, xxii, no. 3, pp. 303–333, 1 pl. London, 1924.

This article on the cultivation of the banana includes notes on its insect pests. Of these the most important is the black stem weevil, *Cosmopolites sordidus*, which is particularly destructive in Fiji. Its bionomics and control are discussed.

A pest causing injury to the fruit in Fiji is a small moth. The injury, known as " Scab," at first takes the form of cracks in the skin of the fruit made by the thread-like larvae, and these later spread and become discoloured patches that sometimes extend to the edible portion of the fruit, causing it to decay. Dusting each hand of young fruit with pyrethrum powder before the cracks have opened, is an effective control.

A Nematode, *Tylenchus* sp., is a frequent pest of the " Gros Michel " banana in several countries, causing swellings on the roots. The older leaves of affected plants become yellow and die, and the suckers are stunted. All suckers used for planting from districts where the pest is known to occur should be steeped in a solution of mercury bichloride (1 oz. to 6 gals. water) for at least two hours, the roots having been cut back close to the bulb and all adhering soil removed. The growth of affected plants should be stimulated by manuring, and the soil should be kept in good tilth to encourage the roots to penetrate more deeply, as the surface roots are the ones most liable to attack.

Seasonable Spraying Notes.—*Fruit World of Australasia*, xxv, no. 9, pp. 406–408, 2 figs. Melbourne, September 1924.

The pests and diseases that require spring treatment on all the principal fruit crops in Australia are briefly reviewed, and suitable sprays are recommended, with general hints on spraying and methods of application.

Kelly (R.). **Thrips : an unpopular Insect, treated popularly.**— *Vict. Nat.*, xl, no. 3, pp. 49–57, 1 pl. Melbourne, July 1923.

The damage done by thrips is chiefly to the pistils of flowers. The insects perforate and suck the style, the flower shrivels and fruit fails to set. They also attack tender foliage.

The eggs are generally laid on the underside of the leaf of the food-plant, the period of incubation lasting 2–3 weeks. There are at least two larval and two pupal moults, and the complete life-cycle takes about a month. The life of the adult is 90–100 days, during which period it may produce eggs at the rate of five or more daily for two months. A mild winter and a warm, humid spring favours the increase of the insects.

Lists of Australian and of Papuan species of thrips are given.

Clark (J.). **Ants as Pests.**— *Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 3, pp. 317–319, 1 fig. Perth, September 1924.

Although Western Australia probably harbours more ants than any other country, few species are regarded as serious pests of farm or orchard crops. The various harvesting ants live almost entirely on

the seeds of native grasses and small plants. The most troublesome species is probably the meat or mound ant, *Iridomyrmex detectus*, which is highly carnivorous and destroys large numbers of insects, both beneficial and otherwise, and also acts as a protector of Aphids, mealybugs, etc. In New South Wales this ant has been recorded as having begun to attack *Citrus*, from which it cuts off small leaves and twigs and strips of soft bark, carrying the fragments to its nest. Chiefly for this reason, orchardists should exterminate all nests of this ant found near their property; the method of doing this with carbon bisulphide is described.

Newman (L. J.) & Clark (J.). **The Tuart Bud Weevil** (*Haplonyx tibialis*).—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 3, pp. 357–360, 4 figs. Perth, September 1924.

The weevil, *Haplonyx tibialis*, is a pest of the flower buds of tuart (*Eucalyptus gomphocephala*), which is one of the most useful hardwood trees. The female drills a hole in the capsule of the flower bud, depositing a single egg therein, and after ovipositing in one or more of the buds on a stalk, returns along the twig and cuts it off or rings it so that it falls shortly afterwards. This chiefly occurs from November to April, large numbers of terminal twigs with flower buds attached covering the ground at the base of the trees during this period. When in contact with the ground, the flower buds soften and thus become edible for the larvae within. The flower buds of the red flowering gum (*E. ficifolia*) are similarly attacked, though to a less extent. The egg hatches in from 8 to 12 days, and the larva at first feeds in the tip of the bud; after about 4 months it bores its way to the base of the bud and there pupates, the adult cutting its way out about a month later. The only parasite of any importance as yet observed is a Braconid of the genus *Iphiaulax*, and this is not sufficiently numerous to make any appreciable difference to the numbers of the weevil.

Remedial measures against *H. tibialis* are almost impossible owing to the manner of its life. It is suggested that when an abnormal crop of flower buds is produced in excess of weevil requirements, which happens in some years, every effort should be made to collect as much of the seed as possible in order to make up for the loss in other years.

Newman (L. J.). **Fruit-fly : Description and Control.**—*W. Australia Dept. Agric.*, Bull. 122, 44 pp., numerous figs. Perth, 1924.

This is a revision of a previous bulletin [*R. A. E.*, A, ix, 260]. Considerable success has been obtained recently with the use of bait traps against *Ceratitis capitata* (fruit-fly) in Western Australia. The type of trap recommended is described [*R. A. E.*, A, xii, 411].

Newman (L. J.). **Woolly Aphis Parasite.** *Aphelinus mali*, **Hald.**—[W. Australia Dept. Agric.] Leaflet no. 128, 6 pp., 3 figs. Perth, [1924].

This is a reprint of a paper previously noticed on the introduction of *Aphelinus mali* from New Zealand against *Eriosoma lanigerum* [*R. A. E.*, A, xii, 361].

ALLEN (W. J.) & STOKES (W. B.). **Calcium Cyanide for Citrus Fumigation. A Comparison with Sodium Cyanide.**— *Agric. Gaz. N.S.W.*, xxxv, no. 9, pp. 664–666. Sydney, September 1924.

In furtherance of trials previously described [*R. A.E.*, A, xii, 35, 113], comparative tests have been made of fumigation with calcium cyanide and with sodium cyanide. The relative costs, based on prices at Sydney, show that the latter is the cheaper. With both methods a certain amount of damage was done, young growth being killed and leaves falling; but though the tests were carried out under severe conditions (with 100 per cent. humidity and the trees at times wet with dew), no serious damage resulted, and new growth quickly followed the scorching that occurred. The chief pests on the trees were red scale [*Chrysomphalus aurantii*] and white louse [*Pseudococcus*]. Both calcium and sodium cyanide gave good results; and it is considered that either may be used in the humid coastal areas, provided that treatment is not done under conditions of high humidity, on wet trees or during the daytime.

GURNEY (W. B.) & BRERETON (W. le G.). **The Green Peach Aphis and its Control.**— *Agric. Gaz. N.S.W.*, xxxv, no. 9, pp. 667–668. Sydney, September 1924.

A green peach aphis, apparently identical with *Myzus* (*Rhopalosiphum*) *persicae*, Sulz., the green peach aphis of California and elsewhere, has been troublesome at intervals since its first appearance in New South Wales in 1910. The remedy that has proved successful consists of 1 gallon miscible oil with sufficient washing soda to produce a thorough emulsion, in 25 gallons of water; this should be applied in late winter or early spring, but not later than when the buds are just beginning to swell. There should then be no need for summer spraying. Tobacco wash or nicotine sulphate spray may be used where required as a summer spray, and repeated applications may be necessary.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxii, pt. 3, pp. 150–153. Brisbane, September 1924.

The value of paradichlorobenzene for the control of *Lepidoderma albohirtum*, Waterh. (grey-back cane-beetle) has now been definitely established. Recent experiments are described in which the material in doses varying from $\frac{1}{16}$ to $\frac{1}{4}$ oz. was buried at an average depth of $4\frac{1}{2}$ inches. The rows were from 12 to 18 inches apart and about 6 inches from the centre of the stools. Fumigation does not in any way affect the normal development of the stools; in treated plots the sugar-cane appeared to be slightly higher than in the untreated areas, the difference in tonnage being quite appreciable. There is reason to believe that paradichlorobenzene, like carbon bisulphide, may stimulate the growth of cane by destroying certain injurious soil bacteria. The best time for applying the fumigant is December and January, beginning as soon as the beetles appear on the wing, which is usually in November. At the time recommended the ground is in most suitable condition for fumigation and can be worked with little risk of injury to the young crop. The crude and cheaper forms of the chemical are just as effective against cane grubs as the refined qualities.

FROGGATT (J. L.). **Banana Weevil Borer.**—*Queensland Agric. Jl.*, xxii, pt. 3, pp. 154–156. Brisbane, September 1924.

This brief summary of previously recorded observations and recommendations concerning the banana weevil borer [*Cosmopolites sordidus*, Germ.] has been prepared in order that a considerable amount of information may be gathered into a readily accessible form.

The Histerid enemy of this weevil, *Plaesius javanus*, En. [*R. A. E.*, A, xi, 65] has been found alive 2 to 3 months after liberation.

JACK (R. W.). **The Coming Campaign against Locusts.**—[*S. Rhodesia*] *Minist Agric. & Lands*, Bull. 516, 6 pp. Salisbury, October 1924.

The organisation of the next campaign against locusts in Rhodesia, in accordance with the Locusts Destruction Ordinance of 1918, is described. The leaflet issued by the Department of Agriculture concerning their destruction by means of sodium arsenite sprays, of which a preliminary notice has been published [*R. A. E.*, A, xii, 320] is reprinted. This recommends, for young hoppers (within two weeks of hatching), 3½ oz. (by weight) of dry sodium arsenite or 3 fluid oz. of concentrated solution to 4 gals. For older hoppers the strength may be slightly increased but should never exceed 4½ oz. by weight or 4 fluid oz. to 4 gals. The dry sodium arsenite should be dissolved by heating in a little water over a fire, and then the rest of the water should be added. For extensive operations 11 lb. of the dry sodium arsenite can be boiled in 1 gal. of water and 3 fluid oz. of this solution used in 4 gals. of water for spraying. When dry sodium arsenite is used, care should be taken that it has entirely dissolved in the vessel before use. In Southern Rhodesia, where the grass grows fairly luxuriantly and water is available, spraying is generally found to be the better method of applying the poison, but on poor land in arid regions the bait method is generally more convenient. Certain precautions necessary in the use of this poison are discussed.

JACK (R. W.). **Locusts as Food for Stock.**—[*S. Rhodesia*] *Minist. Agric. & Lands*, Bull. 518, 4 pp. Salisbury, October 1924.

As a food for stock, dried locusts or locust meal forms a concentrated substance rich in protein and, in July at least, usually rich in fats, the quantity of fat depending largely on the condition of the females in regard to egg development. Analyses are given showing the value of this food from collections made at different seasons. As locust meal is deficient in carbohydrates, it is necessary to mix it with some such food as maize meal, which fulfils this requirement; about 1 lb. of locust meal with 5 lb. of maize meal makes a suitable mixture, to be supplemented with grazing or bulky foods. Two specimen rations for stall-fed animals, containing a proportion of locust meal are suggested. Winged locusts are most easily collected during the first half of the dry season, when they gather in dense masses at night. Hoppers may be driven into pits or sacks by means of traps with long converging wings of sheet iron or canvas. The insects may be killed by immersion in boiling water and must afterwards be thoroughly dried in the sun. They can then be ground in a mill before use. The possibilities of establishing a trade in locust meal are discussed, the chief difficulty being the irregularity or uncertainty of the supply.

VAN HALL (C. J. J.). **Ziekten en Plagen der Cultuurgewassen in Nederlandsch-Indië in 1923.** [Diseases and Pests of Cultivated Plants in the Dutch East Indies in 1923.]—*Meded. Inst. Plantenziekten*, no. 64, 47 pp. Buitenzorg, 1924.

Potatoes were attacked by the Coccinellid, *Epilachna* [*vigintioctopunctata*] and *Agrotis*. Sweet potatoes were infested by *Cylas formicarius* (*turcipennis*), but little harm was done.

Forest pests included *Calotermes tectonae* on teak; a Cossid borer (*Zeuzera* ?) in *Cassia siamea*; *Zeuzera coffeae* in mahogany and sandalwood; *Valanga* (*Orthacanthacris*) *nigricornis* on teak; *Xyleborus fornicatus* in *Schleichera trijuga*; and *Selenothrips rubrocinctus* on various seedlings. Investigations on borers of timber in store showed Lyctid beetles to be chiefly concerned.

Cotton was infested to an unimportant extent by a bollworm, *Earias fabia*. Kédelé [*Glycine hispida*] was attacked by the stem-borer, *Agromyza sojae*, the pod-borer, *Etiella zinckenella*, and the Chrysomelid beetle, *Plagiodera inclusa*.

Young plantations and nurseries of cinchona everywhere were infested by *Helopeltis antonii*. Other pests of this crop included Coccids such as *Pseudococcus citri*; the caterpillars of *Attacus atlas*, *A. ricini*, *Euproctis flexuosa* and *Metanastria hyrtaca*; and the mites *Liacarus*, *Brevipalpus obovatus* and *Tetranychus bimaculatus*.

Coconut pests were the caterpillars of *Parasa lepida* and *Belippa laleana*; the coconut beetle, *Oryctes* [*rhinoceros*]; the palm weevil, *Rhynchophorus ferrugineus*, which also infested oil palms; the Hispid, *Brontispa longissima*; and locusts. The coffee berry borer, *Stephanoderes hampei*, was the principal pest of coffee, but did less harm in 1923 than in the preceding year, partly owing to the greater care in combating it.

The banana moth, *Nacoleia* (*Notarcha*) *octosema*, was recorded as injurious. Mangos were attacked by a Jassid, *Idiocerus niveosparsus*.

Pests of rice included the caterpillars of *Cirphis* (*Leucania*) *unipuncta*, a gall-midge, *Cecidomyia* sp., a bug, *Leptocorisa acuta*, and the caterpillars of *Schoenobius incertellus*(*bipunctifer*) and *Sesamia inferens*.

Oregma lanigera is the most general pest of sugar-cane, which was attacked also by the caterpillars of *Phissama interrupta*, a locust, *Aularches miliaris*, and mites, *Tetranychus exsiccator* and *Eriophyes* (*Phytoptus*) spp.

In some localities tea was seriously injured by *Helopeltis*, but as a rule little harm was done. Besides the Nematode parasite already known, there is a Hymenopterous parasite, which in one instance seemed to have definitely helped in checking the pest. A beetle, *Phytorus* [*dilatatus*] and the caterpillars of *Stauropus* [*alternus*], *Andraca* [*bipunctata*] and *Setora* [*nitens*] are the other pests of tea mentioned.

SCHMIDT (E.). **Bemerkungen über einige deutsche Rüsselkäfer.** [Notes on some German Weevils.]—*Zeitschr. wiss. Insektenbiol.*, xix, no. 8, pp. 187–190, 1 fig. Berlin, 31st October 1924.

Rhynchites coeruleus, DeG., oviposits in the young shoots, especially of pear. *R. interpunctatus*, Steph., oviposits in the leaf-ribs, usually of apple, but occasionally of pear. *R. pauxillus*, Germ., is another

species that deposits its eggs in the leaf ribs of apple. It has also been recorded as attacking the buds of apple trees. *R. coeruleocephalus*, Schall., feeds on the foliage of birch.

Stellwaag (F.). **Der Baumweissling** *Aporia crataegi* **L.** [The Black-veined White, *A. crataegi*.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 273–312, 23 figs. Berlin, October 1924.

Since 1917 *Aporia crataegi*, L., has done considerable damage in the Rhine Palatinate [*R. A. E.*, A, x, 598], and this paper gives a very full record of biological and other observations, either original or compiled from the literature, to which 81 references are given in the bibliography.

The butterflies usually appear in May, and the eggs are laid towards the end of May on the upper surfaces of the leaves. Incubation lasts 20–25 days, and the larval stage extends from June to the following April. The pupal stage lasts 15–21 days. A list of the food-plants is given.

In the Palatinate the primary parasites observed were the Tachinids, *Agria affinis*, Fall., and *Phryxe vulgaris*, Fall.; the Ichneumonids, *Pimpla instigator*, F., and *Theronia atalantae*, Krieg; the Braconids, *Apanteles glomeratus*, L., and *A. difficilis*, Nees; and the Chalcid, *Monodontomerus aereus*, Walk. Their effect is, however, small. A polyhedral disease that covered large areas, but was intermittent in its action, was first noticed in 1921.

Eckstein (K.). **Bausteine zur Lebensgeschichte der Forleule.** [Data for the Life-history of the Pine Moth.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 313–326, 2 figs. Berlin, October 1924.

The outbreak of the pine moth [*Panolis flammea*] that began in 1923 in Germany has prompted the issue of these unpublished results of work done in 1912 and 1913. Some 500 observations were made with eggs kept separate and watched through all stages of development.

In the open the flight-period began on 14th March 1913; indoor emergence was earlier. The adult moths lived for about 28 days. The sexes were in equal numbers. Oviposition occurred 2–9 days after mating, an average of about 26 eggs being laid daily. Incubation indoors lasted 15 days at least. In the open the minima for 2 batches were 11 and 14 days. Cage observations, which are tabulated with data on temperature, moisture and weather, show that *P. flammea* needs comparatively little warmth in order to be induced to fly at sunset, that rain does not interfere with mating and oviposition, and that the length of the incubation period is closely dependent on the temperature. The young larva migrates in a few days to the May shoots. After four moults the larva descends to the ground and pupates. The following averages were obtained: Incubation 20 days, first larval stage 7, second 6, third 5, fourth 5. After this, 11 days elapse before the larva disappears under the ground covering, where after a further 5 days pupation takes place. The pupal period lasts 300 days.

In the fourth stage the larva eats about 6 pine-needles daily; after the fourth moult it requires 18. In this last period the large quantities of fat needed by the adult are acquired.

Vietinghoff von Riesch (A. Frhr. von). **Das Verhalten paläarktischer Vögel gegenüber den wichtigeren fortschädlichen Insekten. Biezönologische Studien.** [The Behaviour of Palaearctic Birds towards the more important Insect Pests of Forests.]—*Zeitschr. angew. Ent.*, x, nos. 1 & 2, pp. 1–55 & 326–352. Berlin, April & October 1924.

The title of this extensive paper indicates its contents. The chief insect pests dealt with are the nun moth [*Liparis monacha*], bark-beetles, and *Melolontha* spp., and the importance of birds in relation to them is exhaustively recorded from the existing literature and from series of stomach examinations made by the author.

Eidmann (H.). **Die Eiablage von *Trioxys* Hal. (Hym., Braconidae) nebst Bemerkungen über die wirtschaftliche Bedeutung dieses Blattlausparasiten.** [The Oviposition of *Trioxys*, Hal., with Remarks on the economic Importance of this Parasite of Aphids.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 353–363, 4 figs. Berlin, October 1924.

A full description is given of the oviposition of the Braconid, *Trioxys* (?) *aceris*, Hal., which parasitises only the green apple aphis, *Aphis pomi*, DeG. In a series of experiments it failed to attack other Aphids. Only the young stages of *A. pomi* are attacked, *i.e.*, those preceding and following the first moult. Only one egg is laid in each host. Though the author's observations were confined to a short period early in August, he concludes that *T. aceris* is the most important and effective natural enemy of the green apple aphis.

Dingler (M.). **Biologische Notizen über verschiedene Cocciden.** [Biological Notes on various Coccids.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 364–386, 10 figs. Berlin, October 1924.

These notes are preliminary to a large paper to be issued later. The species dealt with include many of the known Coccids, much of the material being from Central Europe and Italy.

Dingler (M.). **Eine neue Coccide an der Fichte.** [A new Coccid on Spruce.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 387–389, 2 figs. Berlin, October 1924.

Pseudococcus tirolensis, sp. n., is described from the bark of old spruce trees in the Austrian Tyrol.

Wünn (H.). **Südliche Schildläuse im Rheintal.** [Southern Scale-Insects in the Rhine Valley.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 390–397. Berlin, October 1924.

Very little is known as to the origin of the Coccids found in the valley of the Rhine, but the author ascribes to the Mediterranean fauna the three species *Asterolecanium fimbriatum*, Boy., *Filippia oleae*, Costa, and *Aspidiotus labiatarum*, March. There is a second group of

southern species, which have never become established, but which may possibly be able to extend their range northwards, including *Coccus* (*Lecanium*) *hesperidum*, L., *Aspidiotus hederae*, Vall. (perhaps also *A. britannicus*, Newst.), and *Pulvinaria floccifera*, Westw.

KEMNER (N. A.). **Der Batatenkäfer** (*Cylas formicarius* **F.**) **auf Java und den benachbarten Inseln Ostindiens.** [The Sweet Potato Weevil, *C. formicarius*, in Java and the neighbouring Islands of the East Indies.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 398–435, 14 figs. Berlin, October 1924.

In Java and the neighbouring islands *Cylas formicarius*, F., is an important pest of sweet potato (*Ipomoea batatas*). No wild food-plants have been found, and in an experiment *Ipomoea pes-caprae* planted close to *I. batatas* was not infested. Further study is necessary to ascertain the whereabouts of *C. formicarius* when rice occupies the fields in rotation with sweet potato. Most of the eggs are laid on those parts of the tubers nearest the surface of the ground; if a tuber is half buried the exposed part is attacked first. Newly emerged females begin feeding after about three days, and oviposit after 7–9. The larvae hatch in 5–9 days, and make their way into the tubers, the larval stage lasting 25–26 days. Pupation occurs in a widened part of the mine. After a pupal period of 6–7 days, the adult remains without feeding for 2–3 days and then attacks the leaves, stems and tubers. Thus the total life-cycle in Java requires 40–44 days, with 3–5 days more until oviposition occurs.

The losses due to *C. formicarius* are important, especially if the tubers are left in the ground, but hitherto costly remedial measures have not been justified. The distribution of the pest in infested sweet potatoes should be prevented. Furthermore crop rotation should be more thoroughly practised. All stages of the weevil should be destroyed where possible, special attention being paid to infested tubers. Such tubers left lying in the fields are the greatest danger as regards spread of the pest. They should be burned, cooked, or kept under water for about three weeks. Even if they are buried three feet deep some of the weevils can reach the surface. Storehouses should be screened with wire gauze, and healthy tubers, only, stored in sand. In Java *C. formicarius* has few, if any, insect parasites, and this is taken to indicate that it is an introduced species. A fungus, *Isaria* sp., under experimental conditions destroyed 100 per cent. of the pest.

BAER (W.). **Ueber das Bohrgeschäft von** *Ephialtes*. [On the Boring by *Ephialtes*.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 458–460. Berlin, October 1924.

This paper gives information complementary to the data obtained by Dingler on the oviposition of the Ichneumonid, *Ephialtes manifestator*, L. [*R.A.E.*, A, xi, 203].

BOLLE (J.). **Ein Feind der Blutlaus des Apfelbaumes.** [An Enemy of the Woolly Apple Aphis.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 463–465, 4 figs. Berlin, October 1924.

This is a notice regarding the parasite, *Aphelinus mali*, Hald., and its use against *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., in Italy.

MARTINI (E.). **Ueber die Notwendigkeit von Temperaturangaben bei bionomischen Mitteilungen.** [On the Necessity for indicating Temperatures in Communications on bionomic Subjects.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 466–468. Berlin, October 1924.

The title sufficiently indicates the contents of this paper.

LINGLER (M.). **Ueber einen eigenartigen Fall von Vergesellschaftung bei Cocciden.** [A peculiar Case of Association in Coccids.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 468–469. Berlin, October 1924.

In the case here recorded a colony of *Coccus* (*Lecanium*) *hesperidum*, L., on oleander, was destroyed by the Chalcid parasite, *Coccophagus scutellaris*, Dalm. Subsequently the dead scales provided a breeding-place for the more harmful species, *Pseudococcus adonidum*, L., which otherwise could not have obtained on the smooth leaves the refuge it always needs.

FRICKHINGER (H. W.). **Massenauftreten von** *Ptinus fur* **L.** [A Mass Occurrence of *P. fur*.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 469–470. Berlin, October 1924.

A brief account is given of an abnormally severe infestation of *Ptinus fur*, L., in a dwelling house, considered to be due to the habit, now prevalent in Germany, of storing food-stuffs in quantity.

ANDRES (A.). **Etwas über den "Boll weevil."** [Some Notes on the Boll Weevil.]—*Zeitschr. angew. Ent.*, x, no. 2, pp. 470–472. Berlin, October 1924.

This is a very brief résumé of existing information on the cotton boll weevil, *Anthonomus grandis*, Boh., in the United States.

v. LENGERKEN (H.). **Eulan M.**—*Zeitschr. angew. Ent.*, x, no. 2, pp. 472–476. Berlin, October 1924.

Further experiments made with Eulan M., the Bayer product for protecting fabrics, etc., against clothes moths, show that if untreated material is available no attack is made on treated material. In the absence of untreated material, a little of the nap may be taken for forming the cocoons, but no feeding occurs.

TRAPPMANN (W.). **Der Kampf gegen die Olivenfliege** (*Dacus oleae*) **als Beispiel einer einheitlichen und grosszügigen Schädlingsbekämpfung.** [Work against the Olive Fly, *D. oleae*, as an Example of a uniform and large-scale Campaign against Insect Pests.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 11, pp. 81–82. Berlin, 1st November 1924.

The work against *Dacus oleae* in the Mediterranean countries, which has been noticed repeatedly in this *Review*, is the subject of this article.

Digest of Law governing Shipment of Nursery Stock into Mississippi.—*State Plant Bd. Mississippi*, Nursery Inspec. Circ. 3, 4 pp. Agric. Coll., Miss., 1st October 1924.

All nurseries must be equipped for fumigation and an affidavit filed that all apple, pear, peach, plum, pecan and other food-plants of San José scale [*Aspidiotus perniciosus*] will be fumigated immediately before being delivered for shipment into Mississippi. All nursery stock must be so packed as to prevent infestation by injurious insects or diseases. Nursery stock that will stand defoliation, and all food-plants of citrus whitefly [*Dialeurodes citri*] must be defoliated before being introduced into the State. All plants likely to carry cottony cushion scale [*Icerya purchasi*], coming from territory in which this insect is known to exist, must be thoroughly scrubbed in a solution of fish-oil soap, 1 lb. to 3 U.S. gals. water before being introduced. Plants infested with root knot, caused by Nematodes, or showing signs of any insect pest or disease may not be shipped into Mississippi.

European Corn Borer Quarantine. Entry of heavily infested Broom Corn.—*Service & Regulatory Announcements. U.S. Dept. Agric., Fed. Hortic. Bd.*, no. 78, p. 15. Washington, D.C., 18th March 1924.

Foreign exporters are warned that broom corn of a high grade, and as nearly free from infestation by the European corn borer [*Pyrausta nubilalis*] as can be obtained, must be selected for the American market, otherwise the importation of this product may be prohibited.

Quarantine on Account of European Corn Borer. Notice of Quarantine No. 43 (3rd Revision). Rules & Regulations Supplemental to Notice of Quarantine No. 43 (3rd Revision).—*Service & Regulatory Announcements. U.S. Dept. Agric., Fed. Hortic. Bd.*, no. 79, pp. 52–56. Washington, D.C., 23rd April 1924.

This revised quarantine, which came into force 1st May 1924, amends the previous regulations [*R.A.E.*, A, viii, 511 ; x, 595 ; xi, 343 ; xii, 14] so as to include new areas infested by *Pyrausta nubilalis*, Hb. The only other change is the elimination of spinach from the articles under regulation.

Gipsy Moth & Brown-tail Moth Quarantine. Restrictions on Movement of Nursery Stock.—*Service & Regulatory Announcements. U.S. Dept. Agric., Fed. Hortic. Bd.*, no. 79, pp. 35–36. Washington, D.C., 3rd May 1924.

During the larval period of the gipsy moth [*Porthetria dispar*] all nursery stock, before being certified for movement, must be examined, and, if found free from infestation either with egg-masses or wind-blown larvae, must be sprayed with lead arsenate or other approved insecticide to the satisfaction of the inspector.

Quarantine on Account of Gipsy Moth and Brown-tail Moth. Revised Rules and Regulations Supplemental to Notice of Quarantine No. 45. —*Service & Regulatory Announcements. U.S. Dept. Agric., Fed. Hortic. Bd.*, no. 79, pp. 37–42. Washington, D.C., 12th June 1924.

These revised Rules and Regulations [*cf. R.A.E.*, A, xi, 518], which came into force 1st July 1924, redefine the areas designated as infested with *Porthetria dispar* and *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*).

Modification of Satin Moth Quarantine. Amendment No. 2 to Regulations Supplemental to Notice of Quarantine No. 53.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 1 p. Washington, D.C., 13th September 1924.

This Amendment, which became effective 1st October 1924, makes alterations in the list of towns and districts previously designated [*R.A.E.*, A, xii, 117] as areas infested with satin moth [*Stilpnotia salicis*, L.].

Annual Letter of Information No. 37.—*Service & Regulatory Announcements. U.S. Dept. Agric., Fed. Hortic. Bd.*, no. 77 (Suppmt.), pp. 175–222. Washington, D.C., October 1924.

This comprises a list of the pests collected from plants and plant products imported into the United States during 1923.

Wymore (F. H.). **The Garden Centipede,** *Scutigerella immaculata* **(Newport), a Pest of Economic Importance in the West.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 520–526. Geneva, N.Y., October 1924.

Much of the following is taken from the author's abstract. The garden centipede, *Scutigerella immaculata*, Newport, is found widely distributed throughout the world. In recent years it has been considered by economic entomologists of California, Oregon and Utah as among the most important and destructive pests in many truck crop sections of these States. In California it is particularly destructive to asparagus shoots and seedlings of beans, peas, melons, etc., the injury being due to the pest making numerous small holes in the food-plant below the surface of the soil. All stages in the life-history have been found in the intensively cultivated asparagus fields.

Paradichlorobenzene and calcium cyanide as soil fumigants have given encouraging results in controlling it and other soil pests, and more extensive experiments with these chemicals are in progress.

Paradichlorobenzene was efficient at the rate of one ounce to three linear feet when scattered along both sides of the asparagus row, the furrows being made close to the crowns with a garden hoe. These experiments were made at the end of May, there being considerable moisture in the soil and a soil temperature of 56° F. Later experiments when the soil was drier were less efficient. In the asparagus fields of the Delta region of the Sacramento River, flooding has proved quite practical as a control in several cases, the best results having been obtained where the fields were kept thoroughly and continuously covered to a depth of a foot or more for two or three weeks.

VORHIES (C. T.). *Cylindrocopturus jatrophae* **Fall, a New Economic Insect.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 526–527. Geneva, N.Y., October 1924.

Cylindrocopturus jatrophae, Fall, has been responsible for serious damage to chrysanthemums in Arizona. This Curculionid was first taken on the Euphorbiaceous shrub, *Jatropha macrorhiza*, in the same district. The eggs are probably laid in pits dug in the bark of the chrysanthemum at the surface of the soil. The larvae mine backwards and forwards, but do not necessarily completely encircle the stem. One larva is sufficient to weaken the plant so that it will readily break off. Pupation occurs in the central pith, but it is not certain that this is a general rule. Chrysanthemums at a distance of 120 yards from this infestation remained unaffected. The nearest probable occurrence of *Jatropha* to the site of infestation was about three miles.

TURNER (W. B.). U.S. Bur. Ent. **The Tule Billbug.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 528–532. Geneva, N.Y., October 1924.

Sphenophorus (*Calendra*) *discolor*, Mann. (tule billbug), though only known to the author from certain localities of California, probably coincides in distribution with its native food-plant, the large rush, *Scirpus occidentalis* (locally known as the tule), which is found throughout the State. The adults occasionally injure various cereals, by eating into the stems so that the head becomes bleached and the grain does not form or is shrivelled. Barley suffers the greatest damage, but wheat and oats are also attacked.

The following is the author's abstract of this paper:—The adult tule billbug sometimes injures small grains in California by eating into the stems near the head. The immature stages have been found only in the rootstocks of the tule. There is only one annual generation. The eggs are laid in spring and in early summer, in the mud surrounding the tule roots and sometimes in the tule stems. They hatch in 10 to 13 days. The larvae burrow in the rootstocks during summer and autumn, pupating in cells formed at the end of their burrows in the autumn or early winter. Some change in about 20 days to adults, which hibernate in the pupal cells, and some hibernate as pupae. Adults emerge in spring and are abroad until late summer. They are strong fliers. Eradication of the tules is the only known means of control.

DE ONG (E. R.). **The Preparation and Use of Colloidal Sulfur as a Control for Red Spider.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 533–538. Geneva, N.Y., October 1924.

During tests of the action of lime-sulphur solution on the eggs of *Bryobia praetiosa*, Koch, it was noticed that although only 50 to 60 per cent. of the eggs were ever killed, the majority of mites hatching from the treated eggs died within a few days. These tests were made in the early spring, the maximum temperature ranging from 50° to 65° F., at which ground or sublimed sulphur has little acaricidal action. This suggested that precipitated sulphur (hydrophobic colloidal sulphur) from the lime-sulphur solution was more active than the coarser forms of sulphur. Experiments have, therefore, been made with both hydrophobic and hydrophilic colloidal sulphur.

The usual distinction made between precipitated (hydrophobic) sulphur and a true hydrophilic colloidal solution is largely in the size of the particle. The latter is made by passing hydrogen sulphide through a saturated solution of sulphur dioxide until the odour of the latter cannot be distinguished. This is important, as if free sulphur dioxide remains in the solution it is apt to scorch foliage. This is a stable preparation, in which the particles aggregate but slowly. Hydrophobic colloidal sulphur is prepared by precipitating lime-sulphur solution by adding concentrated hydrochloric or sulphuric acid. (Phosphoric acid offers some advantages, but is more expensive.) The acid was added to the solution to a point of acidity as shown by methyl orange, about 0·5 cc. concentrated acid per 10 cc. of lime-sulphur concentrate (1·3° Bé.) being usually required. Such solutions tend to aggregate sulphur particles up to a point of precipitation within a few days. Glue or gelatine delays this process, especially if added before the acid. For commercial purposes 1 lb. of glue dissolved in water is first added to 5 U.S. gals. lime-sulphur solution, then in addition, 2 to 4 U.S. pts. of concentrated acid, or until the yellow colour disappears and the solution is slightly acid to methyl orange. A larger amount of glue is required if the solution is to stand several days before use. In these preparations the sulphur particles are so finely divided that they are invisible at a magnification of 80 times and are more active than the finest of ground or flowers of sulphur now in use. Though in a few days they may contain many particles similar in size to the better grades of sulphur now on the market, it should be noted that these aggregated particles do not represent all the sulphur present ; there may still be a large proportion of finely divided sulphur too small to be seen.

The results of comparative toxicity tests with adults and larvae of *B. praetiosa* are shown in a table. The colloidal forms of sulphur killed about 99–100 per cent. ; 2 per cent. lime-sulphur solution plus 5 lb. ground sulphur per 100 U.S. gals. killed 90·6 per cent. ; ground sulphur dust killed 44·9 per cent. These applications were made in June, the maximum temperatures of the days following them being 71–78° F. At higher temperatures the differences were less marked, but even then the colloidal forms were always superior.

Colloidal forms of sulphur, particularly the hydrophilic solution, are more dangerous to foliage even than lime-sulphur solution. Under California conditions, where most of the work on red spider is done at high temperatures, it is doubtful if colloidal solutions could be economically substituted for lime-sulphur solution containing free sulphur, at least until an inexpensive process of manufacture is established. Finely divided precipitated sulphur either as a paste or in the dry form may be more satisfactory than true colloidal solutions ; the latter, however, may prove useful in the early spring or in regions where low temperatures retard the oxidation of sulphur. Should it be found that oxidation is too rapid, it may possibly be retarded by the addition of finely-ground sulphur.

Larson (A. O.). U.S. Bur. Ent. **The Effect of Weevily Seed Beans upon the Bean Crop and upon the Dissemination of Weevils,** *Bruchus obtectus,* **Say, and** *B. quadrimaculatus,* **Fab.**—*Jl. Econ. Ent.,* xvii, no. 5, pp. 538–548. Geneva, N.Y., October 1924.

An account is given of work carried on for several years with the object of determining the influence of Bruchid-infested beans and

cowpeas on the production of the crop as well as the probability of the infestation of the crop by *Bruchus obtectus*, Say, or *B. quadrimaculatus*, F., which were contained within the planted seeds. Planting of infested beans reduces the yield as the injury may prevent germination, accelerate decomposition of the germinating seeds, or prevent the cotyledons from developing properly. It does not, however, appear to have any bearing on the infestation of the succeeding crop.

Doane (R. W.). **The Control of Insects in Cereal Food Products.**— *Jl. Econ. Ent.*, xvii, no. 5, pp. 549–553. Geneva, N.Y., October 1924.

The following is the author's abstract of this paper :—Germea, cream of wheat, corn meal and other breakfast cereals are often found to be infested with insects. In an attempt to find the source of this infestation studies were made of the packages in which these cereals are packed and of the sterilisers at some of the mills, and it was found that frequently the sterilisation process is not sufficient to destroy all the insects. At other times the cereal is subjected to a reinfestation after it has been sterilised. A table showing various temperatures at which insects will be killed is given, and a description is given of a sterilising apparatus devised by the author with which electric heat is used to sterilise the cereal with an exposure of approximately 2 seconds.

Armitage (H. M.). **The Citrophilus Mealybug,** *Pseudococcus gahani*, **Green, as a Major Pest of Citrus in Southern California.**— *Jl. Econ. Ent.*, xvii, no. 5, pp. 554–561. Geneva, N.Y., October 1924.

The following is part of the author's abstract of this paper :—The citrophilus mealybug (*Pseudoccoccus gahani*, Green), first found in the citrus orchards of Southern California in 1913, is now established in all of the southern citrus producing counties with the exception of San Diego and Imperial. Owing to adverse climatic conditions this mealybug has proved less serious in the interior counties, and while spread has continued, the infestations have been exceedingly light since the date of the original outbreak. In the coast counties the spread has been rapid, and the infestations as a whole very heavy. The citrophilus mealybug is particularly resistant to fumigation and has the usual resistance of this group of insects to sprays. Water under pressure during the peak of the oviposition period in the spring is by far the most successful means of mechanical control. The Coccinellid, *Cryptolaemus montrouzieri*, Muls., an introduced predator, is particularly effective. Eight county and association insectaries in Southern California are producing and liberating monthly over half a million of these beetles throughout the infested areas of Southern California. Where they are made available in quantity early in the year, they are being used successfully as a control measure.

Campbell (R. E.). U.S. Bur. Ent. **Preliminary Report on the Use of Calcium Cyanide as a Soil Fumigant for Wireworms.**— *Jl. Econ. Ent.*, xvii, no. 5, pp. 562–567. Geneva, N.Y., October 1924.

Wireworms have been particularly injurious to many crops for many years on the Pacific coast. The species concerned are *Pheletes californicus* in California and *P. occidentalis* in Washington. Though the results of experiments with calcium cyanide as a soil fumigant are promising, they are very varied. There are probably many

contributing factors, including temperature, moisture, texture of soil and depth of application. The latter appears to be of great importance, the results being equally bad whether the cyanide was placed too deep or too near the surface. The right depth appears to be about 4–6 in. The best season for application has not yet been determined. The application of calcium cyanide to soil in which potatoes, bulbs and young seedling trees were growing caused injury to the roots or tubers when the cyanide was placed close enough to the plants or used in sufficient quantities for effective killing of the wireworms. The cyanide remains in the soil for only a short time, however, and it is safe to begin planting with a week or ten days after its application. Two hundred pounds per acre, if properly applied, will kill 75 per cent. or more of the wireworms at a cost of about £6, and the benefit of one treatment will extend over two or three years at least, owing to the fact that it requires about three years for these wireworms to reach maturity.

HERBERT (F. B.). **Spray Stimulation.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 567–572, 1 pl. Geneva, N.Y., October 1924.

The following is from the author's abstract of this paper:—Stimulation to deciduous fruit trees has been noted from a number of different sprays, but the greatest amount has occurred after using the heavy types of miscible oils. Stimulation is due partly to the heavy oil base and partly to the emulsifiers. The condition of the tree and soil and time of spraying are factors in the amount of stimulation to be obtained from the oil spray. The spray must be applied between December 15th and February 1st to be certain of it. Although there may be some disadvantages, the advantages are many. The early bloom makes the fruit set early, thereby coming ahead of the emergence of thrips, insuring more and cleaner fruit; large green leaves are formed early, covering small fruit, and protecting it from sunburn and frost; the fruit gains much of its natural growth before moisture evaporates; the tree produces larger crops and larger fruit; fruit will be harvested earlier, insuring better prices.

SHEPHERD (D.). **Life-history and Biology of** *Echocerus cornutus* **(Fab.).**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 572–577. Geneva, N.Y., October 1924.

The Tenebrionid, *Echocerus cornutus*, F., is cosmopolitan in its distribution, but according to available data is injurious to cereal products, in the United States, only in the coast and bay regions of California. The eggs are generally found among the particles of material in which the beetles live, they are laid singly and hatch in 10 days at a temperature of 76° F. The beetles will feed on flour, maize meal, germea, dog biscuits, maize, pancake flour, yeast cakes, bran and farina. A preference is shown for flaky material. The damage is caused by the presence of the dead or living insects either in the larval or adult form in the foodstuffs, the presence of cast skins, the loss of material eaten, and the accumulation of dust and frass. A decided preference is shown for moistened material as compared with dry. This fact may possibly be made use of in the preparation of poisoned baits. Adult beetles succumb to the effects of air-tight sealing in 5 days and the larvae in from 5 to 10 days. The effect of humidity on the rate of development is discussed.

The remedial measures adopted in different countries are, in Germany, the use of *Bacillus thuringensis* ; in England, hermetical sealing ; in Canada, the use of chloropicrin ; and in the United States and elsewhere, the elimination of breeding-places, fumigation with carbon bisulphide and hydrocyanic acid gas, and the heating of mills to a temperature of 120°–130° F. for a period of 12 hours.

LANE (M. C.). U.S. Bur. Ent. **Simple Methods of Rearing Wireworms (Elateridae).**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 578–582. Geneva, N.Y., October 1924.

The following is the author's abstract of this paper :—It is the purpose of this paper to record a few successful and simple methods of rearing one of the most difficult groups of insects with which the economic entomologist has to deal, namely, wireworms of the family ELATERIDAE. The writer's studies and experiences have been confined mostly to two species, *Ludius noxius*, Hyslop, and *Pheletes occidentalis*, Candèze, of Washington State, but since these two species exist under a great variety of conditions from very dry to very wet, it is felt that the suggestions regarding methods and rearing here given can be adapted for other species in other sections.

BARBER (G. W.). U.S. Bur. Ent. **Migration—an Important Habit of the European Corn Borer.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 582–589, 2 figs., 1 pl. Geneva, N.Y., October 1924.

The migratory habits of *Pyrausta nubilalis*, Hb. (European corn borer) in the heavily infested area of Massachusetts are discussed. The following conclusions are drawn :—At times of great abundance of the insect, migration may be extensive, the larvae moving in the autumn in the search of fresh food and suitable winter quarters and in the spring in order to find suitable places for the transformation into the adult. Such places are rolled-up leaves, under the bark of trees, in burrows in wood, or even in plants not favoured as food-plants. These places are also suitable hibernating quarters. Extensive autumn migration is particularly important from the point of view of control, as the larvae may survive in sufficient numbers to cause a destructive infestation the following year.

HAYES (W. P.) & MCCOLLOCH (J. W.). **The Biology of** *Anomala kansana* **(Scarabaeidae, Coleop.).**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 589–594, 1 fig. Geneva, N.Y., October 1924.

From the relative abundance and somewhat general feeding habits of *Anomala kansana*, Hayes & McColloch, this beetle may be regarded as of economic importance and one that may prove a troublesome pest in Kansas. The adults feed at night on strawberry leaves, *Sorghum*, maize, wheat, sweet clover, sumac, rye, etc. The larvae are also general feeders, and have been taken from under logs, on sand dunes, in maize fields, under rocks in woodland, in wheat fields, gardens, blue-grass sod, lucerne land, oat stubble, potato fields and Sudan grass [*Sorghum sudanense*]. Of 200 larvae collected, 95 per cent. were found in wheat fields ; this large proportion may be partly due to the greater facility

in collecting them behind the plough. The eggs are laid in the soil in June to July and hatch in from 9 to 19 days. The total larval stage varies from 322 to 345 days, with an average of 336·3, which includes an average of 4·06 days for the prepupal stage. Pupation occurs in late May, June and early July, lasting from 8 to 20 days.

Ball (E. D.). **The Correct Names of the Leafhoppers infesting the Apple and Potato.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 594–600. Geneva, N.Y., October 1924.

There has been much confusion with respect to the scientific and common names to be applied to the three species of leafhopper infesting apple. Sufficient study has now been made in the different parts of the United States to warrant a fairly definite statement that only three Eupteryginae are commonly found on apple trees. These are *Typhlocyba rosae*, L. (rose leafhopper), *Empoasca maligna*, Walsh (apple leafhopper) and *E. fabae*, Harr. (potato leafhopper). Keys are given for the identification of these leafhoppers and the injury they do.

T. rosae has two generations a year, the winter being passed in the egg stage under the bark, usually of a rose bush. The first generation nymphs live on the lower surface of the rose leaves. The adults fly to apple, where the second generation causes serious damage. Rose is, however, the natural food-plant, and both generations may remain on it, though in seasons of unusual abundance the overwintering eggs may be laid on apple. It is a common, and sometimes serious, pest of apples in the north-western States, where the sweet briar affords a constant food-plant. It was notably injurious in New England in the early season of 1924.

E. maligna, Walsh, of which *E. unicolor*, Gill., is a synonym, has a single generation annually, and spends its whole life on the apple. The winter is passed in the egg stage under the bark of the twigs; the nymphs appear late in spring after the apple leaves are well grown, and feed on the lower surface of the mature leaves. The adults remain on the trees throughout the summer. This species occurs from the Rocky Mountains to the Atlantic, and, in company with the preceding, is responsible for all the injury to mature apple foliage generally shown by the whitening of the upper surface of the leaves.

E. fabae, Harr., is the older name for the species generally known as *E. mali*, LeB.; its other synonyms are also discussed. It is primarily a potato pest, producing the hopperburn that has been so injurious in the northern and eastern United States in recent years. When abundant it also attacks watersprouts and nursery stock of apple, and succulent growth of raspberries, box-elders, gladioli and occasionally other trees and shrubs, producing similar burning. When potato fields are destroyed, it may also migrate to and seriously injure beans.

Guyton (T. L.) & Champlain (A. B.). *Recurvaria nanella*, **Hübner.**—*Jl. Econ. Ent.*, xvii, no. 5, p. 601. Geneva, N.Y., October 1924.

Recurvaria nanella, Hb., occurred in large numbers on peach, quince, sweet cherry and plum in Pennsylvania, the larvae causing considerable damage to young leaves. In some instances as many as 50 per cent. of the terminals were infested.

Marcovitch (S.). *Strategus antaeus* **injuring Peach.**— *Jl. Econ. Ent.*, xvii, no. 5, p. 601. Geneva, N.Y., October 1924.

The adults of *Strategus antaeus* were found burrowing underground and girdling one- and two-year-old peach trees in Tennessee. Injury was most severe in orchards on new ground and with an abundance of oak stumps. The beetles probably bred from the latter.

Britton (W. E.). **A European Leaf-miner of Birch.**— *Jl. Econ. Ent.*, xvii, no. 5, p. 601. Geneva, N.Y., October 1924.

The insect responsible for damage to grey birch (*Betula populifolia*) in Connecticut during the summer of 1923 has provisionally been identified as the European sawfly, *Fenusa pumila*, Klug, which had not previously been known to occur in the United States. Dr. Felt has observed the work of this sawfly in eastern New York State.

Baerg (W. J.). **A Spittle Insect** (*Lepyronia quadrangularis*).— *Jl. Econ. Ent.*, xvii, no. 5, p. 602. Geneva, N.Y., October 1924.

Lepyronia quadrangularis caused considerable injury to maize in Arkansas. Many of the plants turned brown and the stalks died. The insects had apparently migrated from an adjoining field of timothy grass, which had been cut two weeks previously.

Flanders (S. E.). **A New Egg-parasite of the Codling Moth.**— *Jl. Econ. Ent.*, xvii, no. 5, p. 602. Geneva, N.Y., October 1924.

Prospaltella sp. was found parasitising 3 per cent. of the eggs of the codling moth [*Cydia pomonella*, L.] on English walnuts in California during June and July 1924.

Anderson (W. E.) & Holloway (T. E.). **Wireworms injuring Sugar-cane.**— *Jl. Econ. Ent.*, xvii, no. 5, pp. 602–603. Geneva, N.Y., October 1924.

Wireworms, *Melanotus* sp., are recorded, so far as is known for the first time, as seriously damaging sugar-cane in Louisiana. About 250 acres of stubble cane were completely destroyed, together with about 50 acres of plant cane. They fed on the eyes of the planted seed cane, and bored into the young plants below the surface of the ground. Maize in adjoining fields appeared to be free from attack. The sugar-cane was on reclaimed land that was probably naturally infested.

Smith (M. R.). **The Apparent Eradication of the Argentine Ant from Fayette, Mississippi.**— *Jl. Econ. Ent.*, xvii, no. 5, pp. 603–604. Geneva, N.Y., October 1924.

A very brief account is given of the successful eradication of a localised infestation of the Argentine ant [*Iridomyrmex humilis*, Mayr] in Fayette, Mississippi, by the application of poison in large quantities. The poison was applied in 1922 and again in 1923, and in June 1924 none of the ants could be found. Numerous native ants were, however, present, such as *Solenopsis geminata*, F. (fire ant), *Monomorium minimum*, Buckley, *Prenolepis* sp. and *Pheidole dentata*, Mayr.

HUNTER (W. D.). U.S. Bur. Ent. **The so-called Cotton Flea.**—*Jl. Econ. Ent.*, xvii, no. 5, p. 604. Geneva, N.Y., October 1924.

Serious injury to cotton during 1923 and 1924, principally in southern Texas, was generally attributed by farmers to the Capsid, *Psallus seriatus*, Reut. What appears to be the same form of injury was reported during July 1924 also from Georgia and Carolina. On the attacked plants the very young squares are withered, the number of fruiting branches is reduced, and the main stem grows excessively tall. All varietal characteristics are obliterated, and the plants resemble sterile rogues. Investigations begun in 1923 are not yet sufficiently advanced to warrant any very definite conclusions; they indicate, however, that the insect transmits a virus of some kind, producing profound changes in the habit of growth of the plant, which are entirely out of proportion to the number of insects found in the fields. A full report is to be published later.

CATCHINGS (T. F.) & WHITCOMB (W. D.). U.S. Bur. Ent. **Notes on Winter Mortality of the three Coccids** *Pseudaonidia duplex* **(Ckll.),** *Chrysomphalus aonidum* **(Linn.), and** *Chrysomphalus dictyospermi* **(Morg.), at New Orleans, Louisiana.**—*Jl. Econ. Ent.*, xvii, no. 5, pp. 604–606. Geneva, N.Y., October 1924.

Records are given of the mortality of these three Coccids as a result of frost, natural enemies and other natural causes. As *Chrysomphalus aonidum* and *C. dictyospermi* are primarily leaf-infesting species and many of their favourite food-plants are completely defoliated, this condition, combined with an almost complete mortality from frost, seems to have temporarily reduced the economic importance of these Coccids in New Orleans. The apparently greater resistance to cold of *Pseudaonidia duplex* seems to add to its possibility as an economic pest of national importance.

The Aphid Situation.—*Florida Ent.*, viii, no. 2, pp. 24–25. Gainesville, Fla., September 1924.

The new Aphid recorded as attacking *Citrus* [*R. A. E.*, A, xii, 405] has been identified as *Aphis spiraecola*, Patch, which is now considered to be identical with *A. pomi*, DeG. [*R. A. E.*, A, xii, 417]. The origin of the recent outbreak on *Citrus* is still a mystery; the insect may only just have reached the citrus-growing region, or may have only recently developed a strain that prefers citrus as a food, or it may have been present on *Citrus* for some years and have become abundant recently owing to favourable conditions.

WATSON (J. R.). **Thysanoptera of N.A.**—*Florida Ent.*, viii, no. 2, pp. 29–30. Gainesville, Fla., September 1924.

Liothrips vaneeckei, Priesner, hitherto known only from Europe, has recently been found infesting lily bulbs in Los Angeles, California. *Phloeothrips drakei*, Wats., is now found to be identical with *Acanthothrips karnyi*, Hood, and *Dictyothrips floridensis*, Wats. [*R. A. E.*, A, xi, 36] to be an *Echinothrips*, apparently identical with *E. americana*, Morg. A list is given of recent additions to the American Thysanoptera.

Floyd (W. L.). **Citrus Insects and Diseases in Florida.**— *Amer. Fruit Grower*, xliv, no. 2, pp. 16, 35, 42–43, 5 figs. 1924. (Abstract in *Rev. App. Mycol.*, iii, pt. 10, p. 579. Kew, Surrey, October 1924.)

Dialeurodes citri (whitefly) is attacked by five species of entomogenous fungi, at least three of which effectively help to hold it in check ; these are the red fungus (*Aschersonia aleurodis*), the yellow fungus (*A. flavocitrina*), and the brown fungus (*Aegerita webberi*). *Lepidosaphes beckii* (purple scale) and *L. gloveri* (long scale) are attacked by the red-headed fungus (*Sphaerostilbe coccophila*), the grey-headed fungus (*Ophionectria coccicola*) and the black fungus (*Myriangium duriaei*) ; *Chrysomphalus aonidium* (Florida red scale) is infested by the pink fungus (*Microcera fujikuroi*). Various methods of disseminating these fungi have been tried, that most extensively practised being to soak leaves that are well covered with fruiting fungi in water, stir thoroughly, and spray the solution on infested trees during the rainy season. A mixture of two or more fungi is recommended. The leaves and attached fungi may be gathered in the autumn and kept in cold storage until required. The red fungus may be cultivated on sweet potatoes.

Aldrich (J. M.). **Notes on North American Tachinidae.**— *Insecutor Inscitiae Menstruus*, xii, no. 10–12, pp. 145–149. Washington, D.C., October-December 1924.

The synonymy of various genera erected by Townsend is discussed, including that of *Lixophaga*, of which *Euzenillia*, Towns., and *Euzenilliopsis*, Towns., are synonyms. *Lixophaga parva*, Towns., and *Euzenillia aurea*, Towns., are both identical with *L.* (*Hypostena*) *variabilis*, Coq. *Euzenilliopsis diatraeae*, Towns. [*R. A. E.*, A, v, 9], a well known parasite of *Diatraea saccharalis*, F., should therefore be referred to the genus *Lixophaga*.

Hayes (W. P.). **Two Mutillids (Hym.) hyperparasitic on White Grubs (Scarab. Col.).**—*Bull. Brooklyn Ent. Soc.*, xix, no. 4, p. 153. Lancaster, Pa., October 1924.

Mutilla quadriguttata, Say, and *Dasymutilla permista*, Mickle, are recorded from Kansas, from cocoons of *Elis quinquecincta*, F., which is parasitic on *Lachnosterna* (*Phyllophaga*). In the case of the first species a life-cycle of one year is probable.

Faxon (R.). **Hessian Fly, Wheat Insect Survey, 1924.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, ix, no. 7–8, pp. 124–127. Wooster, Ohio, July-August 1924.

The survey of 1924 shows a marked increase of the Hessian fly [*Mayetiola destructor*, Say] in many counties and a decrease in only two of those surveyed. For Ohio as a whole the infestation has increased from an average of 4·3 infested wheat stalks per cent. for 33 counties in 1923 to an average of 10·3 per cent. for the same number in 1924. In some of the north-western counties there has been a determined effort to overcome the infestation. The importance of adhering to the accepted fly-free dates is pointed out, those for 1923 and 1924 being given. The date for sowing must not be delayed to a point where danger of winter killing will occur.

Timberlake (P. H.) & Clausen (C. P.). **The Parasites of** *Pseudococcus maritimus* **(Ehrhorn) in California (Hymenoptera, Chalcidoidea).**— *Univ. Cal. Pubns.*, Ent. iii, no. 2, pp. 223–292, 2 pls., 8 figs. Berkeley, Cal., 16th September 1924.

Part i of this paper consists of taxonomic studies by Timberlake of the following species, reared from *Pseudococcus maritimus*, Ehrh., on grape at Fresno, California :— *Anagyrus clauseni*, sp.n., *A. subalbicornis*, Gir., *Pseudleptomastix squamulatus*, Gir., *Zarhopalus corvinus*, Gir., *Acerophagus notativentris*, Gir., *Achrysopophagus modestus*, sp.n., *Subprionomitus* sp., *Thysanus elongatus*, Gir., of which supplementary descriptions, including that of the male, are given, and *Tetrastichus blepyri*, Ashm. Keys are given to the females of the North American species remaining in the genus *Anagyrus*, and to those of the three species of *Zarhopalus* found in the United States.

Part ii, by Clausen, deals with the biology and interrelations of these parasites and their host. There are three regional forms of *P. maritimus* : the form of southern California, an omnivorous feeder, occasionally of importance as a pest of *Citrus*, parasitised by *Chrysoplatycerus splendens*, How., *Zarhopalus sheldoni*, Ashm., and *Pseudaphycus angelicus*, How., none of these parasites being of any importance ; the form of the San Francisco Bay region, an omnivorous feeder, sometimes a serious pest in pear orchards, with no known parasites ; and the form of the San Joaquin Valley, a pest almost exclusively restricted to grape, parasitised by *A. notativentris*, *Z. corvinus*, and *Anagyrus subalbicornis*, in large numbers, and to a less degree by *Pseudleptomastix squamulatus*. The breeding of the first two of these forms is practically continuous, while the third has two distinct generations in a year. The three forms are morphologically identical, though the form of the Joaquin Valley may be termed a physiological race, its seasonal history being considered as a special adaptation to its particular food-plant. The various parasites will, under laboratory conditions, breed freely upon all three forms. Their restricted habitat is to be attributed to ecological factors. All these are primary parasites of *P. maritimus*, as is also *Anagyrus clauseni*. Hyperparasites are *Achrysopophagus modestus*, *Tetrastichus blepyri*, *Thysanus elongatus* and *Subprionomitus* sp., the only species not known to be attacked by hyperparasites being *Anagyrus clauseni*, *Pseudaphycus angelicus*, and *Zarhopalus sheldoni*. A detailed discussion of the interrelations of these parasites and hyperparasites is given in connection with the bionomics of the individual species. All these parasites are endemic to California and, with a few exceptions, have not yet been recorded elsewhere.

In laboratory breeding experiments, the potato sprout method of rearing, as developed at the California State Insectary, was adopted. In 1919, parasitism of *P. maritimus* on vines in the field exceeded 90 per cent., but this would not be adequate to prevent the deposition by the Coccid of honey-dew on the fruit, which renders it unsaleable. The possibilities of natural control during a season following one of great parasite development have not been determined. The latest remedies against *P. maritimus* include the fumigation of the vines with sulphur during the dormant season. As the parasites at this time are in the advanced larval and pupal stages, it is probable that the mortality rate will exceed that of the host, in which case the result will be the practical eradication of the parasites.

Hamilton (C. C.). **Control of the European Red Mite** (*Paratetranychus pilosus*, **Can. & Fanz.**).—*Maryland Agric. Expt. Sta.*, Bull. 264, pp. 181–238, 8 figs. College Park, Md., April 1924. [Received 7th November 1924.]

An account is given of the life-history and habits of *Paratetranychus pilosus*, Can. & Fanz. (European red mite), as occurring in Maryland, and the food-plants attacked are discussed. Examination during the summer, when the mites were abundant on peach and apple trees, failed to show them on forest trees or shrubs in the vicinity of orchards. The foliage, fruit, and twig and spur growth are all injured by the attack of the mite; the leaves, in particular, suffer from the disappearance of the chlorophyll, which leaves them discoloured and susceptible to scorching from sprays. No parasite of the mite has been observed in Maryland; a list is given of insects that have been recorded as predacious, but in Maryland only one, the beetle, *Stethorus punctum*, Lec., was observed in a single orchard.

A detailed account is given of a large number of tests in control. It is essential in Maryland that delayed dormant sprays should be used against the winter eggs of the mite, supplemented by summer spraying if the infestation should be severe. Against the winter eggs, miscible oils or oil emulsions give the best results; oil and soap emulsions, either proprietary or home-made, have given as good results at a dilution of 1 : 33 as most of the miscible oils at 1 : 15. Sprays containing sulphur as the active ingredient did not prove effective against the winter eggs, neither did kerosene emulsion, nicotine sulphate nor a number of other sprays tested. The summer stages of the mite can be effectively controlled on apple trees by the regular spray schedule of lime-sulphur 1 : 40, if the spraying is thoroughly done. If the foliage of apple becomes infested during the summer, a lime-sulphur spray diluted to 1 part in 75 parts water should be used, with a spreader such as calcium caseinate or flour. The sprays generally recommended for peach trees, such as self-boiled lime-sulphur, sulphur lime dry mix, atomic sulphur, dusting sulphur, etc., have not given good results; the lack of effective summer remedies for stone fruits emphasises the necessity for thorough spraying with oil at the delayed dormant period.

Guyton (T. L.) & Knull (J. N.). **The Round-headed Apple-tree Borer.**—*Pennsylvania Dept. Agric.*, Gen. Bull. 386, 6 pp., 7 figs. Harrisburg, Pa., April 1924. [Received 3rd November 1924.]

Saperda candida, F. (round-headed apple-tree borer) is a serious pest of apples and quinces in some parts of Pennsylvania. The life-history and habits of the beetle are described [*cf. R. A. E.*, A, iii, 586]. The remedies suggested are cutting out the borer or killing it with wire and injecting carbon bisulphide into the holes, afterwards stopping the holes with clay or soap. Where infestation is severe, a wash of lime-sulphur sludge should be applied in the middle of May and again about mid-June as a repellent. Woodpeckers are said to destroy from 50 to 75 per cent. of the borers. When the borers are very numerous, all wild food-plants within half-a-mile of the orchard should be removed.

GUYTON (T. L.) & STEAR (J. R.). **P D B (Paradichlorobenzene) and other Controls for the Peach Tree Borer.**—*Pennsylvania Dept. Agric.*, Gen. Bull. 383, 10 pp., 2 pls., 1 fig. Harrisburg, Pa., March 1924. [Received 3rd November 1924.]

The method of using paradichlorobenzene against *Aegeria exitiosa*, Say (peach tree borer) is described, the dates of treatment recommended for Pennsylvania being from 1st to 15th September for the north and from 20th September to 10th October for the south. Paradichlorobenzene cannot be used with safety on apple trees of any age.

HADLEY (C. H.). **The Japanese Beetle in Pennsylvania.**—*Pennsylvania Dept. Agric.*, Gen. Bull. 390, 19 pp., 1 pl., 6 figs. Harrisburg, Pa., June 1924. [Received 3rd November 1924.]

This is an account of *Popillia japonica*, Newm. (Japanese beetle) and of its occurrence in Pennsylvania. The more important plants attacked by the beetle, including 29 economic plants and 14 non-economic ones (chiefly weeds), are listed. Remedial measures recommended by the United States Bureau of Entomology for application to the various fruit crops are given.

WEISS (H. B.). **Results of the Fourth Year's Work against the Gipsy Moth in New Jersey.**—*New Jersey Dept. Agric.*, Circ. 79, 14 pp., 9 figs. Trenton, N.J., July 1924. [Received 10th November 1924.]

The situation with regard to the gipsy moth [*Porthetria dispar*] in New Jersey in 1923–24 is reviewed, and an account is given of the control work carried on during the year.

Sea Gulls clean up Grasshoppers.—*Official Record, U.S. Dept. Agric.*, iii, no. 42, p. 3. Washington, D.C., 15th October 1924.

Sea gulls, believed to be the Franklin gull, are reported from Montana as being responsible for the almost entire extermination of grasshoppers, in view of which it is suggested that they should be considered as beneficial birds and protected by State Law.

BONDAR (G.). **Dois males nas folhas da mandioca. I.—A " verruga," provocada pelo diptero** *Eudiplosis brasiliensis* **Rbs. II. O " mosaico " provocada pelo thysanoptero** *Euthrips manihoti* **sp. n.** [Two Diseases of the Leaves of Cassava. I. Galls produced by the Dipteron, *E. brasiliensis*, Rbs. II. The " Mosaic " produced by the Thysanopteron, *E. manihoti*, sp. n.]—*Chacaras e Quintaes*, xxx, no. 3, pp. 215–218, 4 figs. S. Paulo, 15th September 1924.

The subject-matter of the first of these articles is substantially the same as that of one already noticed [*R. A. E.*, A, xii, 413].

A description is given of *Euthrips manihoti*, sp. n., which causes spotting on the leaves of cassava [*Manihot utilissima*] and aepim [*M. palmata*]. The measures advised are clearing all native vegetation when planting cassava and washing in a solution of nicotine all material that is to be planted.

Bondar (G.). **Uma broca das anonaceas, o** *Cratosomus dubius*, **F.** [*C. dubius*, a Borer of Anonaceae.]—*Chacaras e Quintaes*, xxx, no. 3, pp. 225–226, 3 figs. S. Paulo, 15th September 1924.

In Brazil Anonaceous plants such as the pineapple and soursop [*Anona muricata*] are attacked by the larvae of the Curculionid, *Cratosomus dubius*, F. The adults appear in October and oviposit on these plants, and the larvae mine the larger branches and the stem, a cylindrical channel being bored downwards. Side passages are made from the main gallery ; they lead to the exterior and serve for getting rid of the excreta and debris, so that the main gallery is kept clear. The total length of a mine may be about 6 feet. Infested plants are killed. After about two years, the larva forms a pupal chamber separated from the mine by plugs of wood shavings, from which the adult emerges in October. Infested branches should be removed and burned, but if they are still vigorous or if the infestation is in the stem, injections of carbon bisulphide may be employed.

O *Stephanoderes coffeae*. **Communicado do Serviço da Defeza do Café.** [*S. hampei*. A Communication by the Coffee Defence Service.]—*Rev. Soc. rur. brasileira*, v, no. 51, p. 265. S. Paulo, September 1924.

Experiments in Brazil have proved that the degree of heat necessary to destroy the coffee berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.) in the berries also affects the quality of the beans. Tests are now being made with fermentation under water.

Bondar (G.). **Lepidopteros nocivos ao cacaoeiro no Estado da Bahia.** [Lepidoptera injurious to Cacao in the State of Bahia.]—*Correio-Agric.*, ii, no. 9, pp. 260–265, 5 figs. Bahia, September 1924.

Many Lepidoptera, mostly unidentified, infest cacao in the Brazilian state of Bahia. The Noctuid, *Melanchroia mexicana*, Gn., feeds on the new leaves and tender shoots and on the young fruits. Many fruits fail to ripen, while in the others the beans develop badly. The larva feeds at night, returning to the same fruit on several consecutive nights. The total life-cycle lasts only a few weeks. The Pyralid, *Sylepta prorogata*, Hmps., skeletonises the young leaves. Its development is very rapid, and this explains the large losses due to it. The Nymphalid, *Callicore meridionalis*, Stgr., feeds on the leaves, but does little harm. Several unidentified Psychids attack the foliage. The fruits are mined by a Microlepidopteron, unidentified and believed to be new. In exceptional cases the mines occur also in the young shoots. After the feeding period the larva moults and enters a stage in which it leaves the mine and prepares for pupation without feeding any more.

Myelois duplipunctella, Rag., has been accused of attacking the fruits of cacao in Brazil, but the author has failed to find it in healthy fruits and believes that it only infests damaged ones.

All caterpillar pests of the leaves and fruits should be combated by spraying with Paris green.

Em defesa dos cafesaes. [The Defence of Coffee Plantations.]—*Correio-Agric.*, ii, no. 9, p. 266. Bahia, September 1924.

During his investigations on the coffee berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.) in the State of Rio de Janeiro, Dr. Costa Lima has found another species hardly distinguishable from it even under minute examination. Its attack, however, is confined to the envelope of the coffee beans, and the resultant injury is insignificant. It occurs also in rotten oranges, and Dr. Costa Lima believes it to be a species of saprophytic habits and not a pest of any importance.

Lahille (F.). **Los enemigos de la fruticultura en San Rafael y los medios de combatirlos.** [The Pests of Fruit at San Rafael and the Means for their Control.]—*Minist. Agric. de la Nación*, Circ. 323, 28 pp., 17 figs. Buenos Aires, 4th October 1924.

The insect pests of fruit trees observed early in 1924 are the following, in order of their local economic importance :—

Aspidiotus perniciosus, Comst., *Cydia pomonella*, L., *Eriosoma* (*Myzoxylus*) *lanigerum*, Hausm., *Scolytus* (*Eccoptogaster*) *rugulosus*, Ratz., *Oeceticus kirbyi*, Guild., *Eriocampoides limacina*, Retz., and *Tetranychus telarius*, L. Notes on the biology and control of these pests are given, but there is little new information. The complete life-cycle of *S. rugulosus* was observed to require 6 weeks. *A. perniciosus* was introduced into the district under review in 1917 and spread through it in 1920, largely through traffic. It is suggested that a fumigation chamber be erected at all railway stations where fruit is exported in order that its spread may be prevented.

Roig (M. S.), Arango (R.) & Montaño (I.). **Tres insectos que atacan a los frutales y el tetuan del boniata.** [Three Insects attacking Orchards and the Sweet-potato Weevil, *Cylas formicarius*.]—*Oficina Sanidad Vegetal*, Bol. 4, 32 pp., 12 figs. Havana, May 1923. [Received 3rd November 1924.]

The Cuban insects dealt with are the Chalcid, *Bephrata cubensis*, attacking *Anona muricata*, *A. reticulata* and *A. squamosa* ; the weevils, *Pachnaeus azurescens*, *P. litus*, *P. psittacus* and *P. costatus*, attacking *Citrus*, *Anona* spp., *Arachis hypogaea*, avocado (*Persea gratissima*) and *Eriobotrya japonica* ; the Bostrychid, *Apate francisca*, boring in the trunks of *Anona* spp. ; and the sweet potato weevil, *Cylas formicarius*, F. Brief descriptions are given of the injuries done by these pests and of the methods for combating them.

The concluding section gives the text of three decrees issued on 18th May 1923. The first lays down the regulations for combating *Aleurocanthus woglumi* in Cuba, while the others prohibit the importation from countries where *Pyrausta nubilalis* and the fruit-fly [*Anastrepha ludens*] are known to exist, of material capable of harbouring them.

La Mosca Morelos. [*Anastrepha ludens*.]—*Bol. Sanidad Vegetal*, December 1923, pp. 4–7, 2 figs. Havana, 1923. [Received 3rd November 1924.]

Acting on behalf of the United States authorities, G. F. Moznette has inspected the orange plantations in Cuba and is stated not to have found there the orange fruit-fly, *Anastrepha ludens*, Lw.

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